300 mA LDO REGULATOR

No.EA-236-240517

OUTLINE

The RP114x is a CMOS-based voltage regulator IC with high output voltage accuracy, low supply current, low dropout, and high ripple rejection. This IC consists of a voltage reference unit, an error amplifier, resistors for setting output voltage, a short current limit circuit, a chip enable circuit, and so on. The RP114x features a minimum input voltage from 1.4V and the output voltage, which can be set from 0.8V to 3.6V (in 0.1V step). The output voltage of this IC is internally fixed. This IC perform with low dropout voltage due to built-in transistor with low ON resistance. Low supply current and a chip enable function prolong the battery life of each system. The ripple rejection, line transient response and load transient response of the RP114x is excellent, thus this IC is very suitable for the power supply for hand-held communication equipment. Since the packages for this IC are DFN(PL)1010-4、DFN(PL)1010-4B、SC-88A、SOT-23-5, therefore high density mounting of the IC on boards is possible.

FEATURES

- Supply Current ..... Typ. 50µA
- Standby Current ..... Typ. 0.1µA
- Input Voltage Range ..... 1.4V to 5.25V
- Output Voltage Range[(1)] ..... 0.8V to 3.6V (0.1V steps)
- Output Voltage Accuracy ..... ±1.0% (V_{SET}>2.0V, Ta = 25°C)
- Temperature-Drift Coefficient of Output Voltage ..... Typ. ±80ppm/°C
- Dropout Voltage ..... Typ. 0.25V (I_{OUT} = 300mA, V_{SET} = 2.8V)
- Ripple Rejection ..... Typ. 75dB (f=1kHz)
- Line Regulation ..... Typ. 0.02%/V
- Packages ..... DFN(PL)1010-4、DFN(PL)1010-4B、SC-88A、SOT-23-5
- Built-in Fold Back Protection Circuit ..... Typ. 60mA (Current at short mode)
- Ceramic capacitors are recommended to be used with this IC ..... 1.0µF or more

APPLICATIONS

- Power source for portable communication equipment.
- Power source for electrical appliances such as cameras, VCRs and camcorders.
- Power source for battery-powered equipment.

[(2)] For other voltages, please refer to *Product-specific Electrical Characteristics.*

SELECTION GUIDE

The set output voltage, the auto discharge function(1), and the package type for the ICs are user-selectable options.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
RP114Kxx1∗(y)-TR	DFN(PL)1010-4	10,000 pcs	Yes	Yes
RP114Kxx1∗(y)-TRB	DFN(PL)1010-4B	10,000 pcs	Yes	Yes
RP114Qxx2∗(y)-TR-FE	SC-88A	3,000 pcs	Yes	Yes
RP114Nxx1∗(y)-TR-FE	SOT-23-5	3,000 pcs	Yes	Yes

xx: Specify the set output voltage within the range of 0.8 V (08) to 3.6 V (36) in 0.1 V step.

(y): If the output voltage includes the 3rd digit, indicate the digit of 0.01V.

Ex. If the output voltage is 1.25V, RP114K121∗5-TR

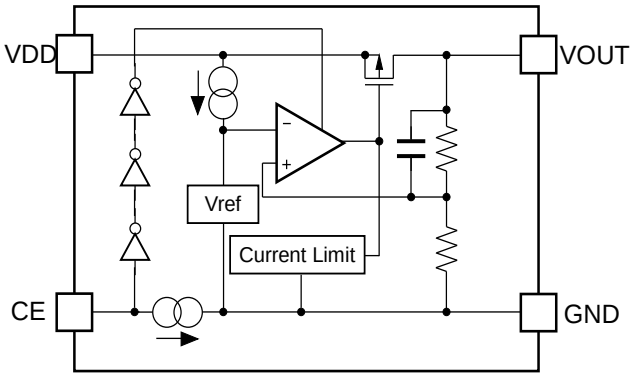
If the output voltage is 1.85V, RP114K181∗5-TR

∗: Specify a combination of the CE pin polarity and the auto-discharge function.

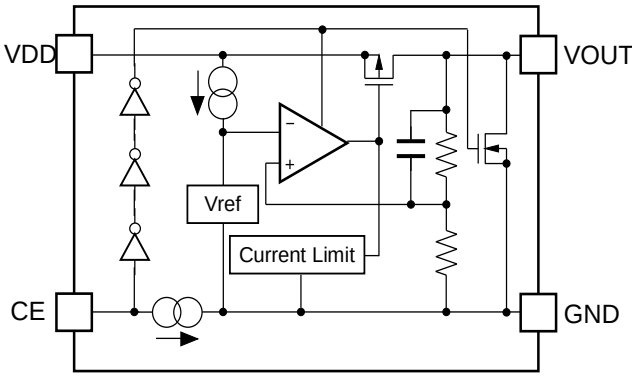
(B) “H” Active, without Auto-Discharge function

(D) “H” Active, with Auto-Discharge function

BLOCK DIAGRAMS



RP114xxxxB Block Diagram



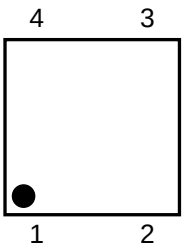
RP114xxxxD Block Diagram

(1) Auto-Discharge function quickly lowers the output voltage to 0V by releasing the electrical charge in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

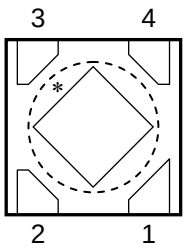
PIN DESCRIPTIONS

RP114K [DFN(PL)1010-4]

Top View

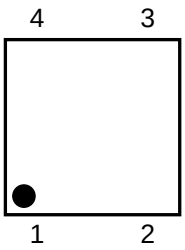


Bottom View

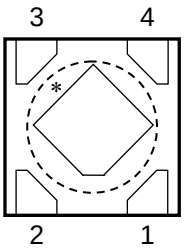


RP114K [DFN(PL)1010-4B]

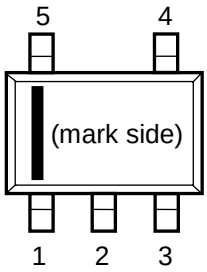
Top View



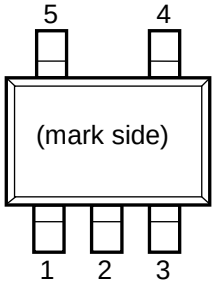
Bottom View



RP114Q (SC-88A)



RP114N (SOT-23-5)



RP114K Pin Description [DFN(PL)1010-4 / DFN(PL)1010-4B]

Pin No	Symbol	Pin Description
1	VOUT	Output Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin ("H" Active)
4	VDD	Input Pin

∗ Tab is GND level. (They are connected to the reverse side of this IC.) The tab is better to be connected to the GND, but leaving it open is also acceptable.

RP114Q Pin Description (SC-88A)

Pin No	Symbol	Description
1	CE	Chip Enable Pin (“H” Active)
2	NC	No Connection
3	GND	Ground Pin
4	VOUT	Output Pin
5	VDD	Input Pin

RP114N Pin Description (SOT-23-5)

Pin No	Symbol	Description
1	VDD	Input Pin
2	GND	Ground Pin
3	CE	Chip Enable Pin (“H” Active)
4	NC	No Connection
5	VOUT	Output Pin

ABSOLUTE MAXIMUM RATINGS

Symbol	Item		Rating	Unit
V_{IN}	Input Voltage		6.0	V
V_{CE}	Input Voltage (CE Pin)		6.0	V
V_{OUT}	Output Voltage		−0.3 to V_{IN}+0.3	V
I_{OUT}	Output Current		400	mA
P_D	Power Dissipation(1)	DFN(PL)1010-4, JEDEC STD. 51	800	mW
		DFN(PL)1010-4B, JEDEC STD. 51	800	
		SC-88A, Our Evaluation Board	380	
		SOT-23-5, JEDEC STD. 51	660	
Tj	Junction Temperature Range		−40 to 125	°C
Tstg	Storage Temperature Range		−55 to 125	°C

ABSOLUTE MAXIMUM RATINGS

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field.
The functional operation at or over these absolute maximum ratings are not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	1.4 to 5.25 (2)	V
Ta	Operating Temperature Range	−40 to 85	°C

RECOMMENDED OPERATING CONDITIONS

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such ratings by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

(2) Refer to *POWER DISSIPATION* for detailed information.
(1) If the input voltage exceeds the maximum value of 5.25 V for some reasons, the operational accumulated time becomes up to 500 hours at 5.5V.

ELECTRICAL CHARACTERISTICS

V_{IN} = V_{SET}[1]+1.0 V (V_{SET} > 1.5 V), V_{IN} = 2.5 V (V_{SET} ≤ 1.5V), I_{OUT} = 1 mA, C_{IN} = C_{OUT} = 1.0 µF, unless otherwise noted.
The specifications in [ ] are guaranteed by design engineering at -40ºC ≤ Ta ≤ 85ºC.

RP114xxxxB/D Electrical Characteristics (Ta=25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
V_{OUT}	Output Voltage	Ta = 25°C	V_{SET} > 2.0 V	×0.99		×1.01	V
			V_{SET} ≤ 2.0 V	-20		+20	mV
		-40°C ≤ Ta ≤ 85°C	V_{SET} > 2.0 V	[×0.97]		[×1.03]	V
			V_{SET} ≤ 2.0 V	[-60]		[+60]	mV
I_{OUT}	Output Current			[300]			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	1 mA ≤ I_{OUT} ≤ 300 mA			15	[40]	mV
V_{DIF}	Dropout Voltage	Please refer to *Product-specific Electrical Characteristics* attached.					
I_{SS}	Supply Current	I_{OUT} = 0 mA			50	[75]	µA
Istandby	Standby Current	V_{CE} = 0 V			0.1	1.0	µA
ΔV_{OUT} /ΔV_{IN}	Line Regulation	V_{SET} + 0.5 V ≤ V_{IN} ≤ 5.25 V (V_{IN} ≥ 1.4 V)			0.02	[0.10]	%/V
R_R	Ripple Rejection	f=1kHz, Ripple 0.2 Vp-p, V_{IN}=V_{SET} +1V, I_{OUT} = 30 mA (When V_{SET} ≤ 2.0 V, V_{IN} = 3.0 V)			75		dB
$\Delta V_{OUT}/\Delta Ta$	Output Voltage Temperature Coefficient	-40°C ≤ Ta ≤ 85°C			±80		ppm /°C
I_{SC}	Short Current Limit	V_{OUT} = 0 V			60		mA
I_{PD}	CE Pull-down Current				0.3	[0.6]	µA
V_{CEH}	CE Input Voltage "H"			[1.0]			V
V_{CEL}	CE Input Voltage "L"					[0.4]	V
en	Output Noise	BW = 10 Hz to 100 kHz, I_{OUT} = 30 mA			75		µVrms
R_{LOW}	Low Output Nch. On Resistance (RP114xxxxD Only)	V_{IN} = 4.0 V, V_{CE} = 0 V			50		Ω

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj ≈ Ta = 25ºC) except for Output Noise, Ripple Rejection, and Output Voltage Temperature Coefficient.

[8] V_{SET}: Set Output Voltage

The specifications in [ ] are guaranteed by design engineering at -40ºC ≤ Ta ≤ 85ºC.

Dropout Voltage by Set Output Voltage (Ta=25°C)

Set Output Voltage V_{SET} (V)	Dropout Voltage V_{DIF} (V)		
	Condition	Typ.	Max.
V_{SET}=0.8	I_{OUT}=300mA	0.560	[0.720]
V_{SET}=0.9		0.510	[0.650]
1.0 ≤ V_{SET} < 1.2		0.460	[0.590]
1.2 ≤ V_{SET} < 1.4		0.390	[0.500]
1.4 ≤ V_{SET} < 1.7		0.350	[0.440]
1.7 ≤ V_{SET} < 2.1		0.300	[0.390]
2.1 ≤ V_{SET} < 2.5		0.260	[0.340]
2.5 ≤ V_{SET} < 3.0		0.250	[0.300]
3.0 ≤ V_{SET} ≤ 3.6		0.220	[0.290]

Product-specific Electrical Characteristics

The specifications in [ ] are guaranteed by design engineering at -40ºC ≤ Ta ≤ 85ºC.

Product Name	V_{OUT} [V] (Ta = 25°C)			V_{OUT} [V] (−40°C ≤ Ta ≤ 85°C)			V_{DIF} [V]	
	Min.	Typ.	Max.	Min.	Typ.	Max.	Typ.	Max.
RP114x081x	0.780	0.800	0.820	[0.740]	0.800	[0.860]	0.560	[0.720]
RP114x091x	0.880	0.900	0.920	[0.840]	0.900	[0.960]	0.510	[0.650]
RP114x101x	0.980	1.000	1.020	[0.940]	1.000	[1.060]	0.460	[0.590]
RP114x101x5	1.030	1.050	1.070	[0.990]	1.050	[1.110]		
RP114x111x	1.080	1.100	1.120	[1.040]	1.100	[1.160]		
RP114x111x5	1.130	1.150	1.170	[1.090]	1.150	[1.210]		
RP114x121x	1.180	1.200	1.220	[1.140]	1.200	[1.260]	0.390	[0.500]
RP114x121x5	1.230	1.250	1.270	[1.190]	1.250	[1.310]		
RP114x131x	1.280	1.300	1.320	[1.240]	1.300	[1.360]		
RP114x131x5	1.330	1.350	1.370	[1.290]	1.350	[1.410]		
RP114x141x	1.380	1.400	1.420	[1.340]	1.400	[1.460]	0.350	[0.440]
RP114x151x	1.480	1.500	1.520	[1.440]	1.500	[1.560]		
RP114x161x	1.580	1.600	1.620	[1.540]	1.600	[1.660]		
RP114x171x	1.680	1.700	1.720	[1.640]	1.700	[1.760]	0.300	[0.390]
RP114x171x5	1.730	1.750	1.770	[1.690]	1.750	[1.810]		
RP114x181x	1.780	1.800	1.820	[1.740]	1.800	[1.860]		
RP114x181x5	1.830	1.850	1.870	[1.790]	1.850	[1.910]		
RP114x191x	1.880	1.900	1.920	[1.840]	1.900	[1.960]		
RP114x201x	1.980	2.000	2.020	[1.940]	2.000	[2.060]		
RP114x211x	2.079	2.100	2.121	[2.037]	2.100	[2.163]	0.260	[0.340]
RP114x221x	2.178	2.200	2.222	[2.134]	2.200	[2.266]		
RP114x231x	2.277	2.300	2.323	[2.231]	2.300	[2.369]		
RP114x241x	2.376	2.400	2.424	[2.328]	2.400	[2.472]		
RP114x251x	2.475	2.500	2.525	[2.425]	2.500	[2.575]	0.250	[0.300]
RP114x261x	2.574	2.600	2.626	[2.522]	2.600	[2.678]		
RP114x271x	2.673	2.700	2.727	[2.619]	2.700	[2.781]		
RP114x281x	2.772	2.800	2.828	[2.716]	2.800	[2.884]		
RP114x281x5	2.822	2.850	2.879	[2.765]	2.850	[2.936]		
RP114x291x	2.871	2.900	2.929	[2.813]	2.900	[2.987]		
RP114x301x	2.970	3.000	3.030	[2.910]	3.000	[3.090]	0.220	[0.290]
RP114x301x5	3.020	3.050	3.081	[2.959]	3.050	[3.142]		
RP114x311x	3.069	3.100	3.131	[3.007]	3.100	[3.193]		
RP114x321x	3.168	3.200	3.232	[3.104]	3.200	[3.296]		
RP114x331x	3.267	3.300	3.333	[3.201]	3.300	[3.399]		
RP114x341x	3.366	3.400	3.434	[3.298]	3.400	[3.502]		
RP114x341x5	3.416	3.450	3.485	[3.347]	3.450	[3.554]		
RP114x351x	3.465	3.500	3.535	[3.395]	3.500	[3.605]		
RP114x361x	3.564	3.600	3.636	[3.492]	3.600	[3.708]		

TEST CIRCUITS

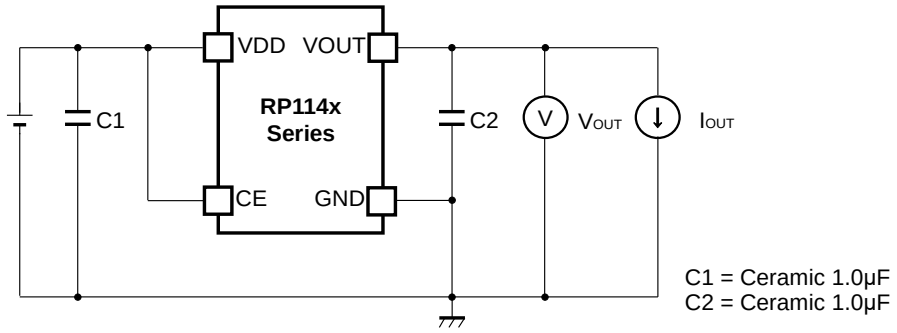


Figure 1. Basic Test Circuit

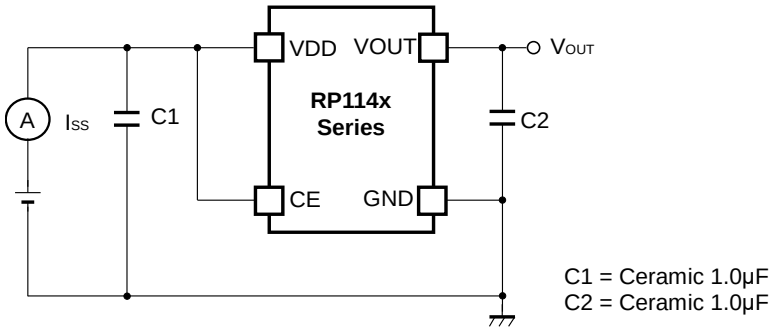


Figure 2. Test Circuit for Supply Current

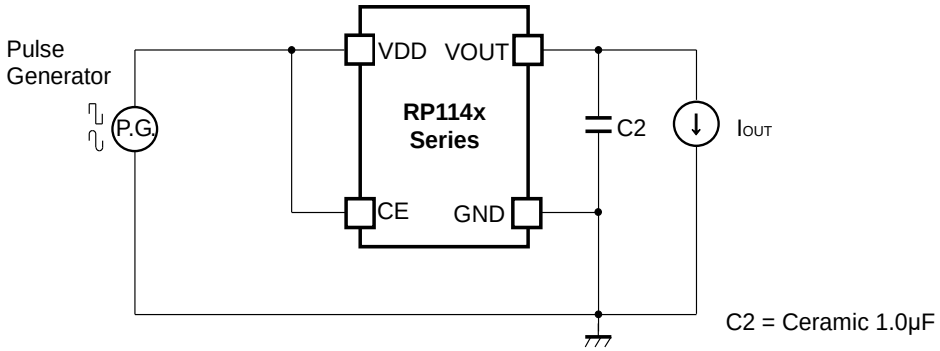


Figure 3. Test Circuit for Ripple Rejection

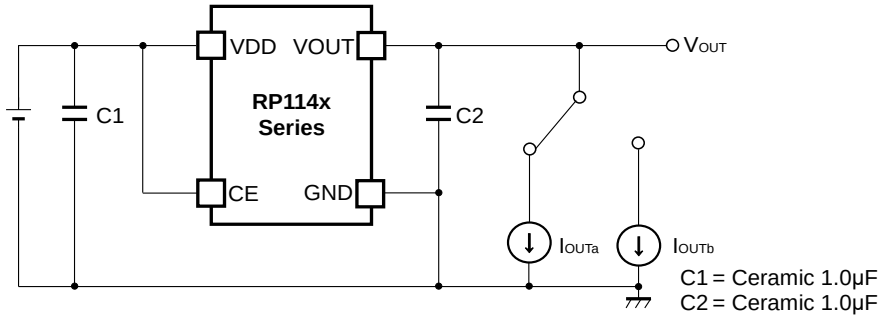


Figure 4. Test Circuit for Load Transient Response

TECHNICAL NOTES ON EXTERNAL COMPONENTS

When using these ICs, consider the following points:

Phase Compensation

In this IC, phase compensation is made for securing stable operation even if the load current is varied. For this purpose, use a capacitor C2 with 1.0µF or more and good ESR (Equivalent Series Resistance).

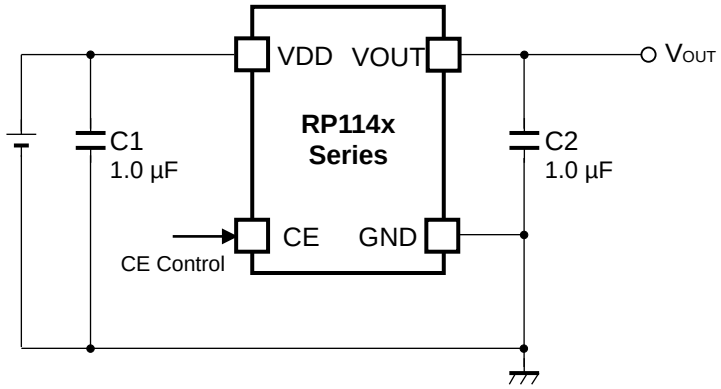
(Note: If additional ceramic capacitors are connected with parallel to the output pin with an output capacitor for phase compensation, the operation might be unstable. Because of this, test this IC with as same external components as ones to be used on the PCB.)

PCB Layout

Make V_{DD} and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor C1 with a capacitance value as much as 1.0µF or more between VDD and GND pins, and as close as possible to the pins.

Set external components, especially the output capacitor C2, as close as possible to the IC, and make wiring as short as possible.

Typical Application Circuit



ESR vs. Output Current

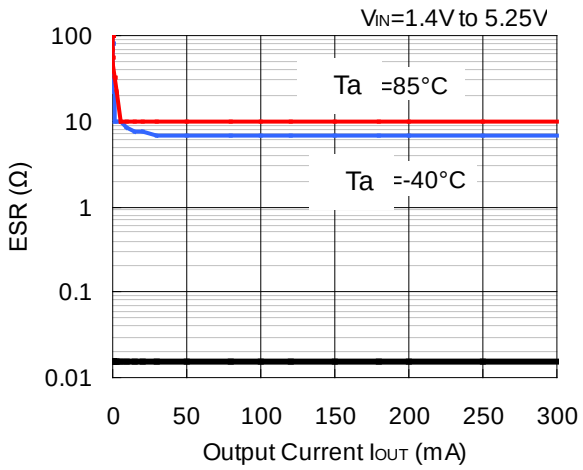
When using these ICs, consider the following points:

The relations between I_{OUT} (Output Current) and ESR of an output capacitor are shown below. The conditions when the white noise level is under 40µV (Avg.) are marked as the hatched area in the graph.

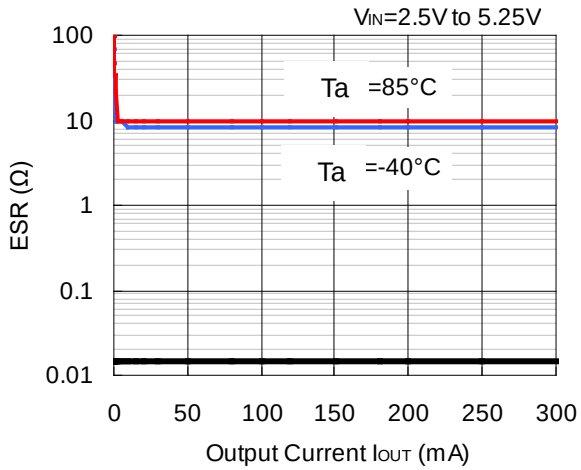
Measurement conditions

Frequency Band: 10Hz to 2MHz
Temperature : –40°C to 85°C
C1, C2 : 1.0µF

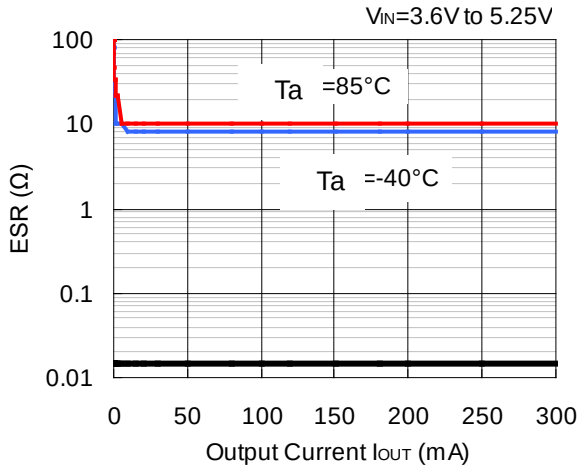
RP114x08xx



RP114x25xx



RP114x36xx

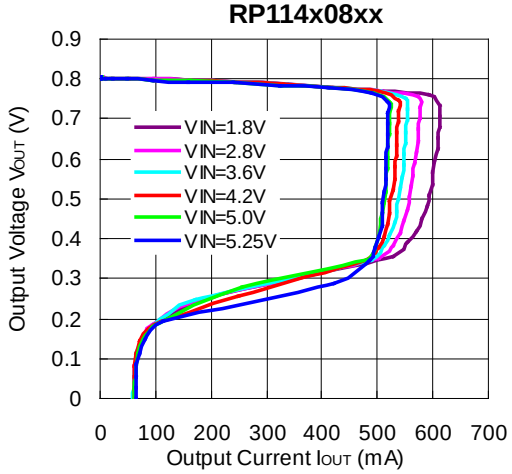


TYPICAL CHARACTERISTICS

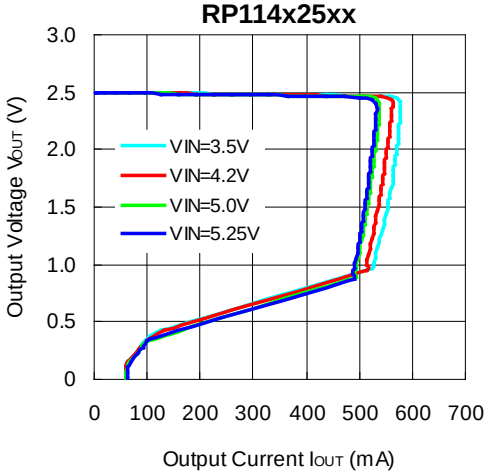
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

1) Output Voltage vs. Output Current (C1=1.0µF, C2=1.0µF, Ta=25°C)

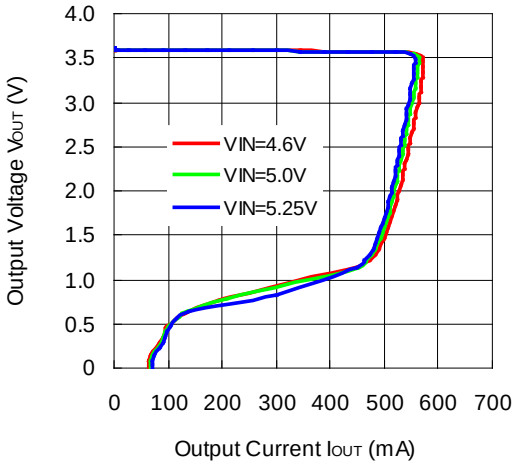
RP114x08xx



RP114x25xx

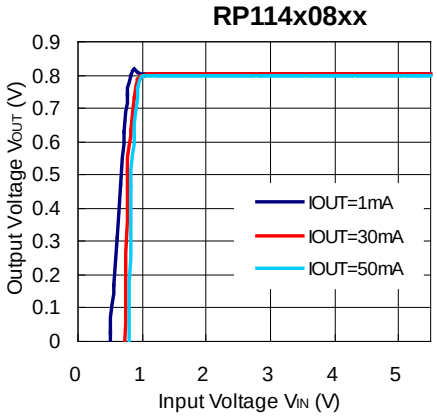


RP114x36xx

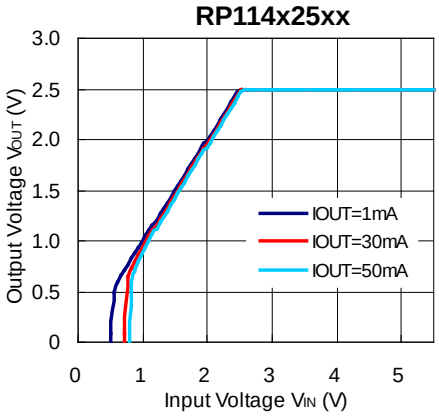


2) Output Voltage vs. Input Voltage (C1=1.0µF, C2=1.0µF, Ta=25°C)

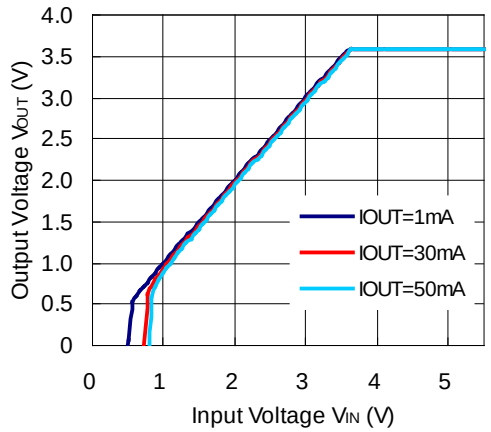
RP114x08xx



RP114x25xx

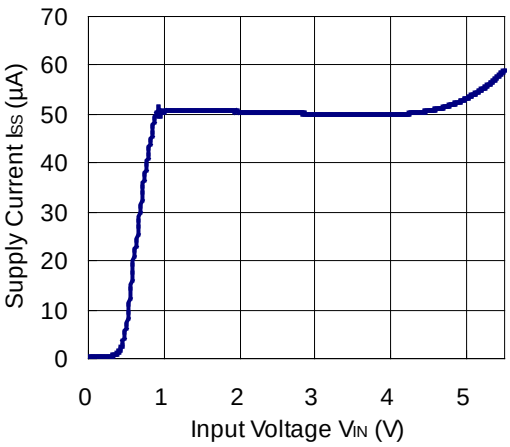


RP114x36xx

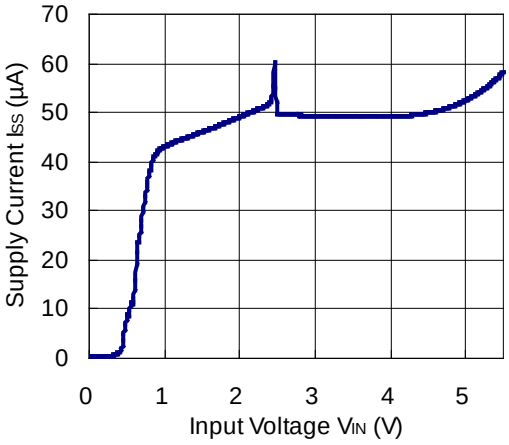


3) Supply Current vs. Input Voltage (C1=1.0µF, C2=1.0µF, Ta=25°C)

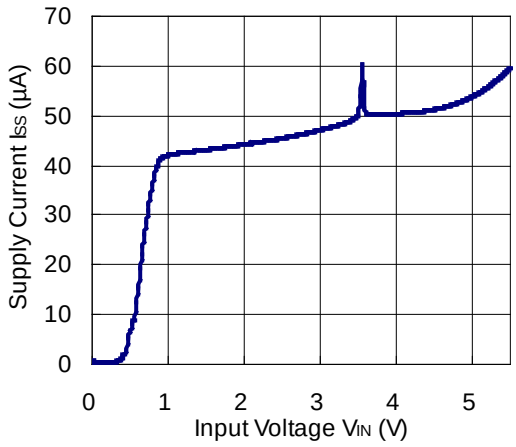
RP114x08xx



RP114x25xx

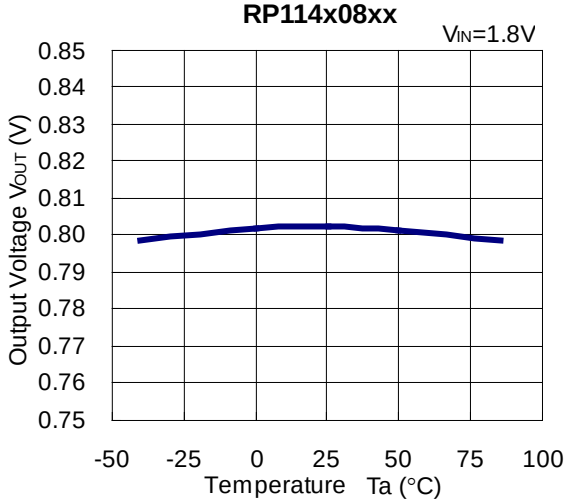


RP114x36xx

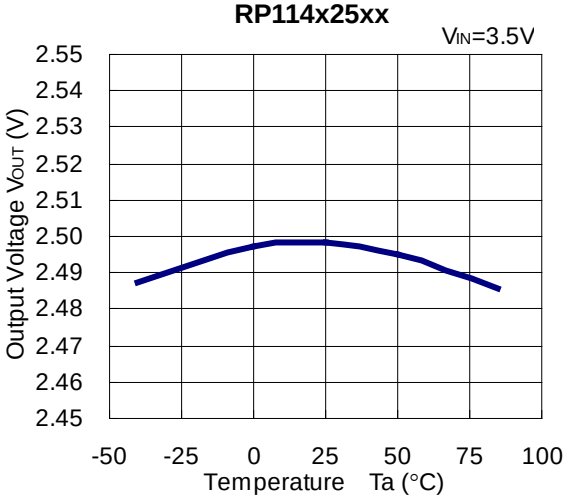


4) Output Voltage vs. Temperature (C1=1.0µF, C2=1.0µF, I_{OUT}=1mA)

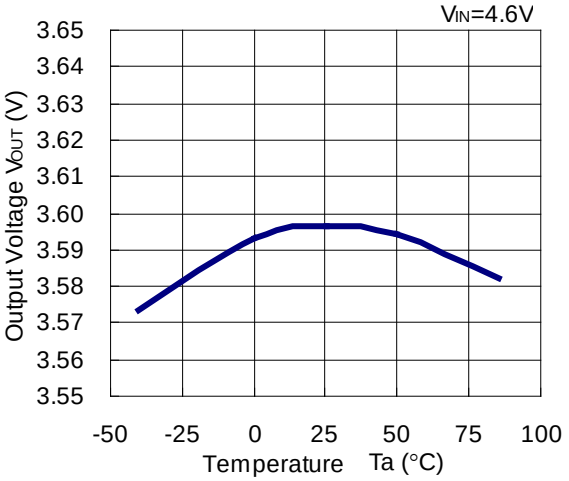
RP114x08xx



RP114x25xx

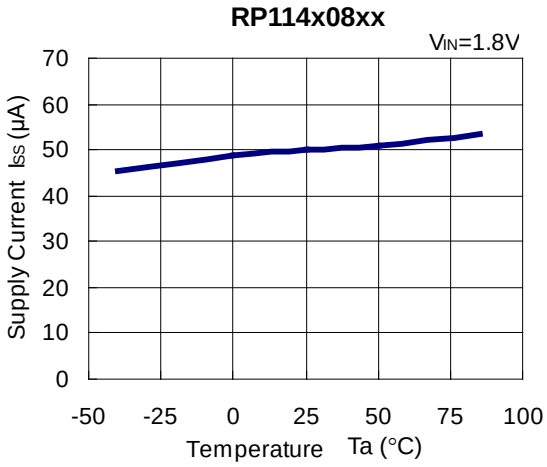


RP114x36xx

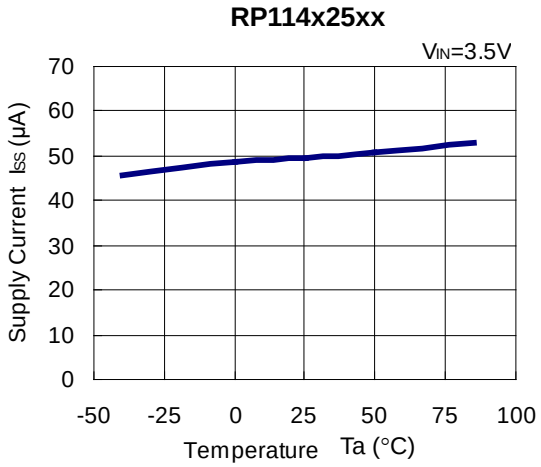


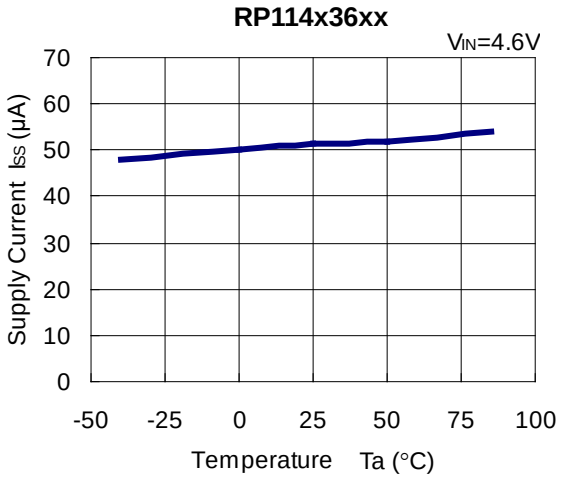
5) Supply Current vs. Temperature (C1=1.0µF, C2=1.0µF, I_{OUT}=0mA)

RP114x08xx

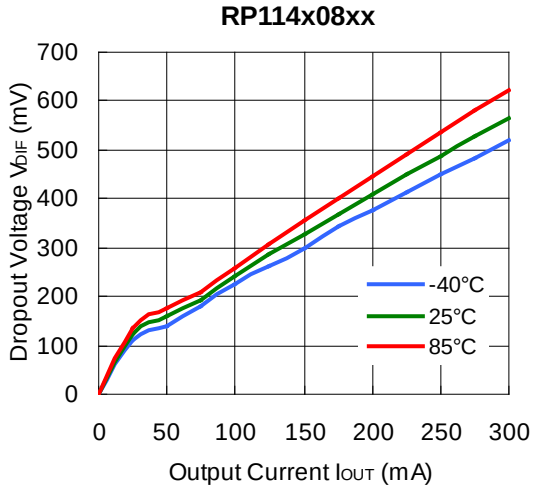


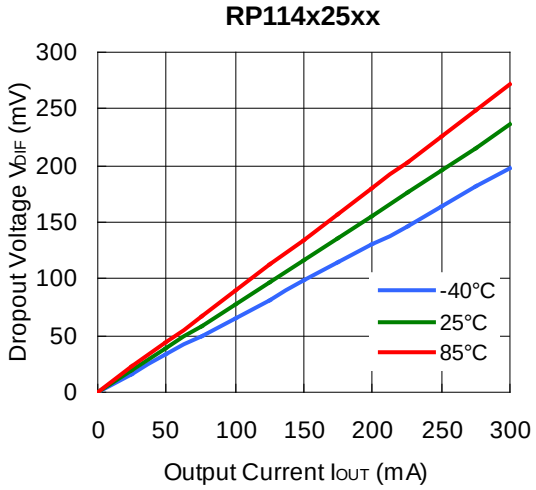
RP114x25xx

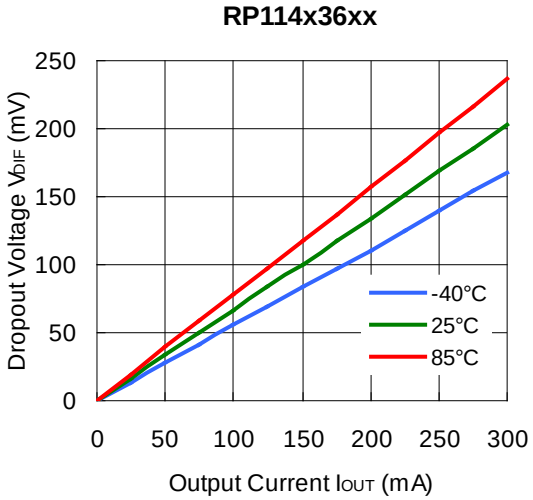




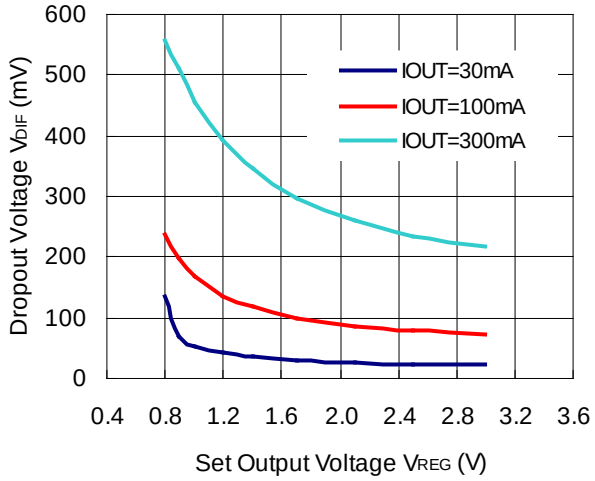
6) Dropout Voltage vs. Output Current (C1=1.0µF, C2=1.0µF)





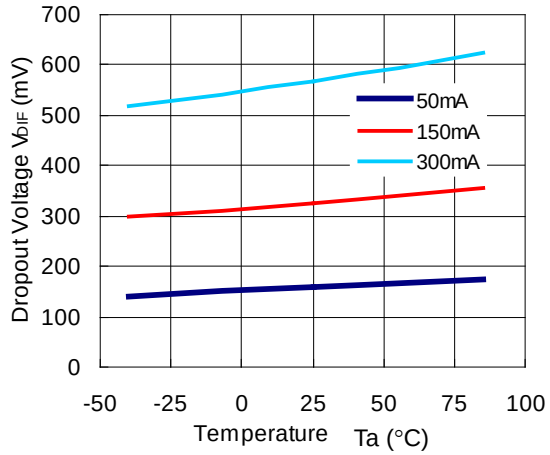


7) Dropout Voltage vs. Set Output Voltage (C1=1.0µF, C2=1.0µF, Ta=25°C)

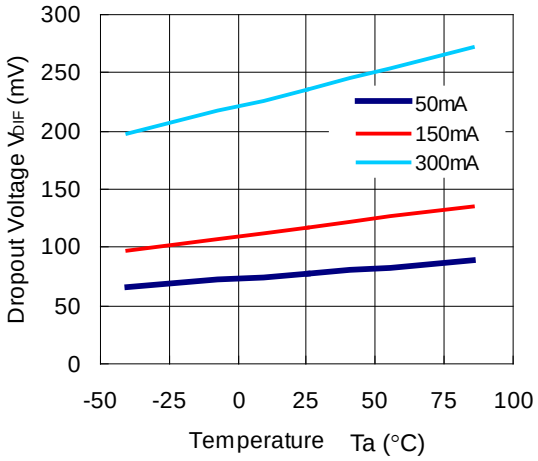


8) Dropout Voltage vs. Temperature (C1=none, C2=1.0µF)

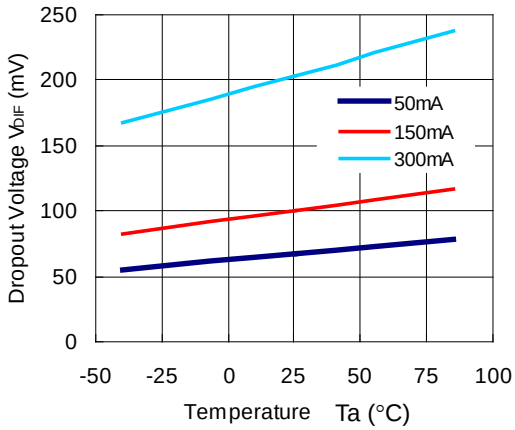
RP114x08xx



RP114x25xx

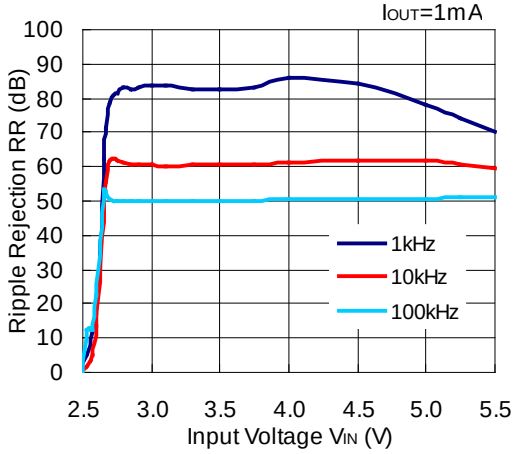


RP114x36xx

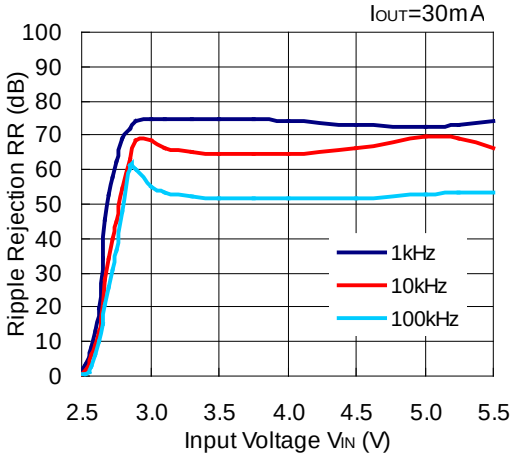


9) Ripple Rejection vs. Input Voltage (C1=none, C2=1.0µF, Ripple=0.2Vp-p, Ta=25°C)

RP114x25xx

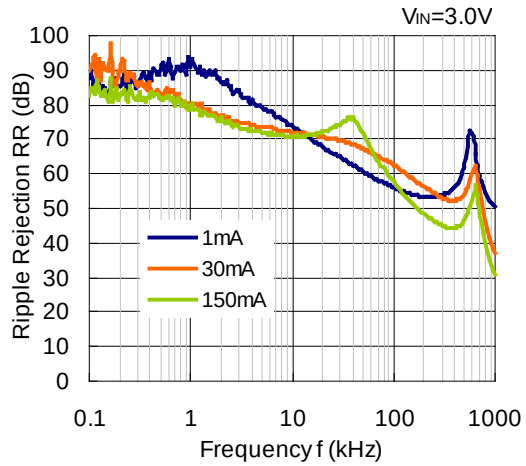


RP114x25xx

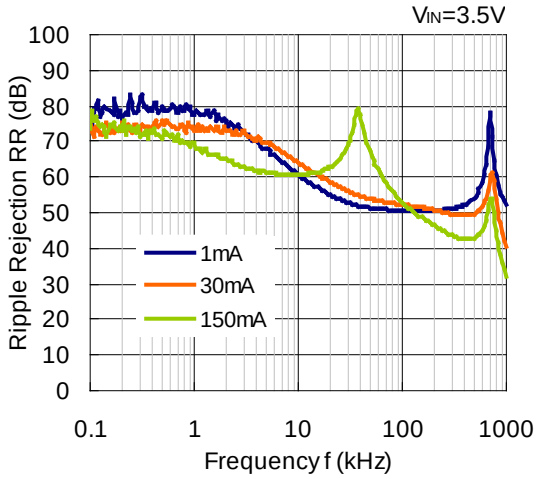


10) Ripple Rejection vs. Frequency (C1=none, C2=1.0µF, Ta=25°C)

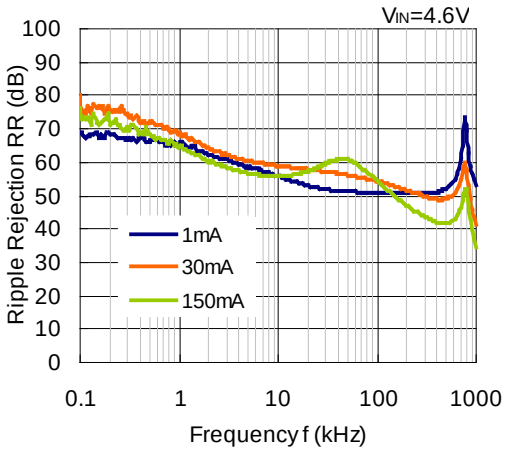
RP114x08xx



RP114x25xx

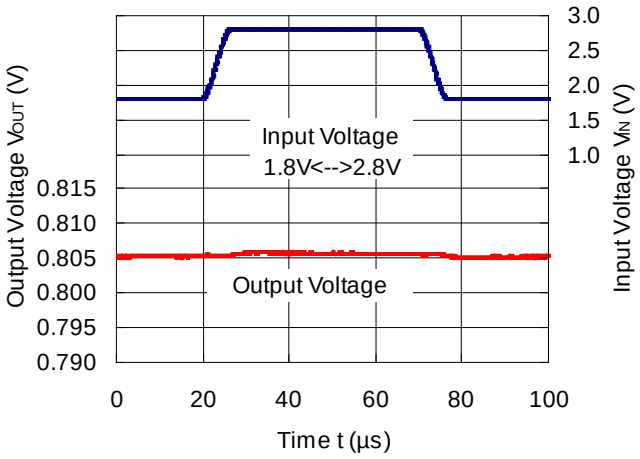


RP114x36xx

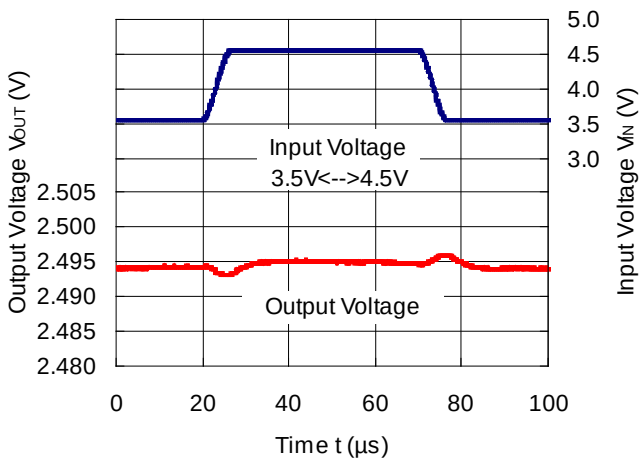


11) Input Transient Response (I_{OUT}=30mA, tr=tf=5µs, Ta=25°C)

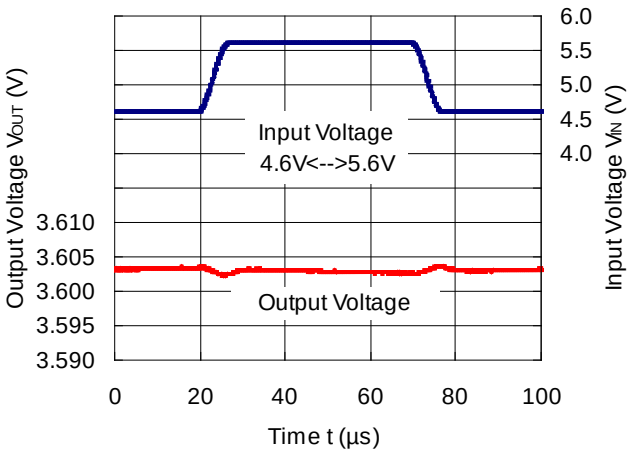
RP114x08xx



RP114x25xx

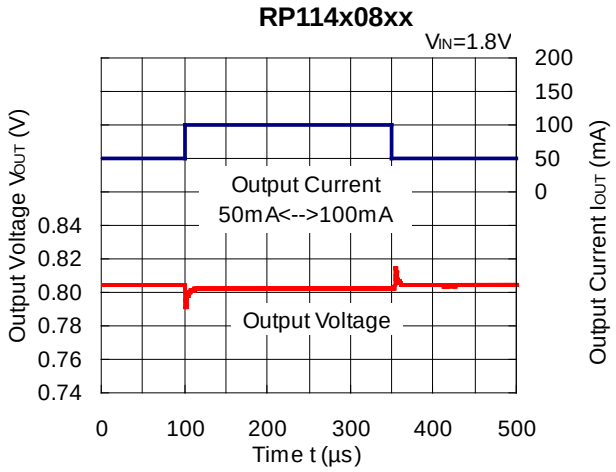


RP114x36xx

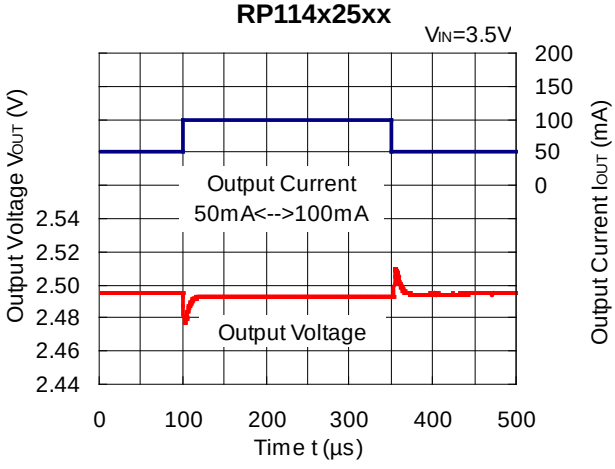


12) Load Transient Response (C1=1.0µF, C2=1.0µF, tr=tf=0.5µs, Ta=25°C)

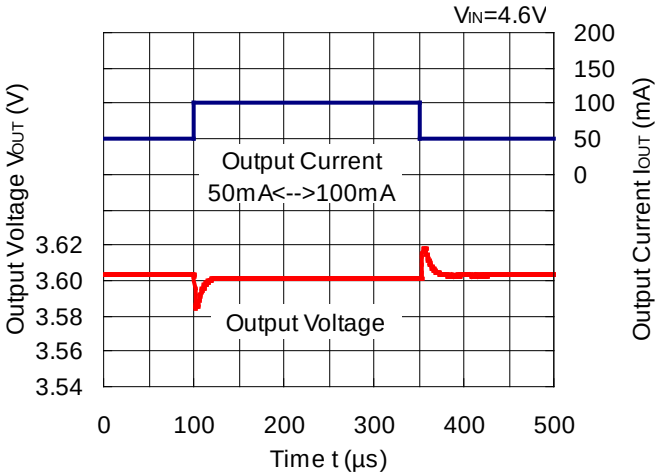
RP114x08xx



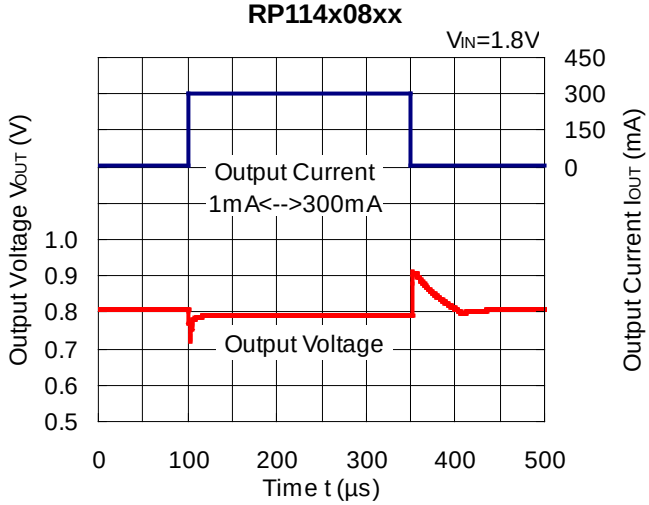
RP114x25xx



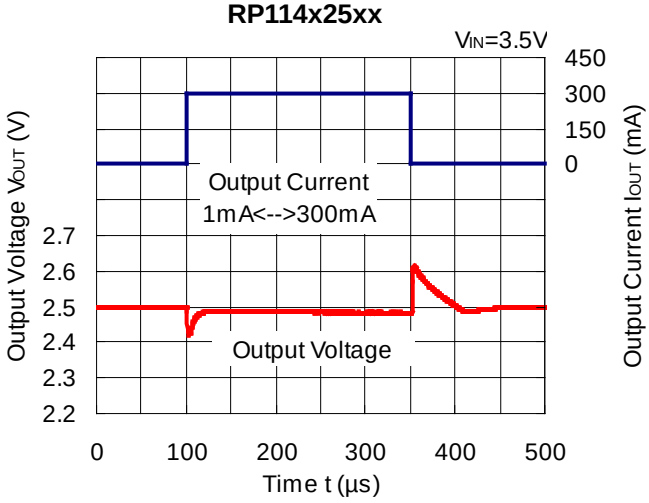
RP114x36xx



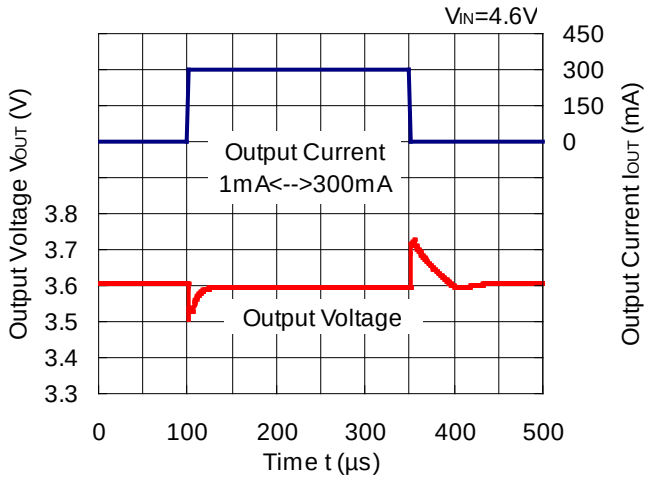
RP114x08xx



RP114x25xx

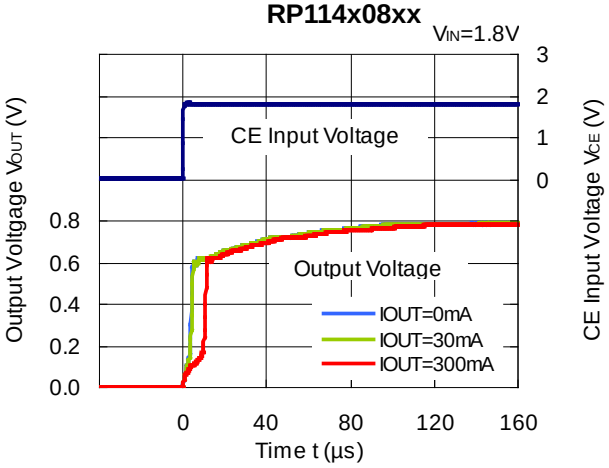


RP114x36xx

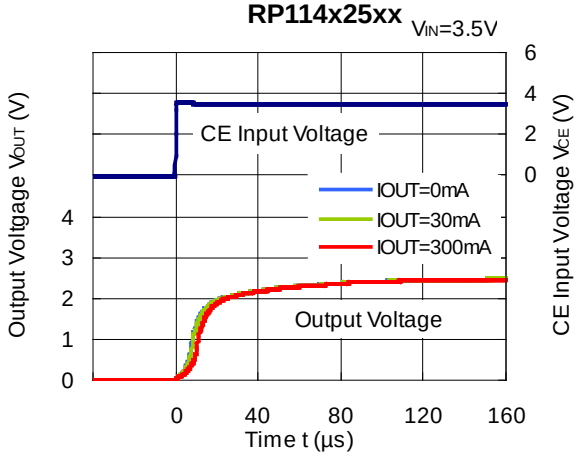


13) Turn On Speed with CE pin (C1=1.0µF, C2=1.0µF, Ta=25°C)

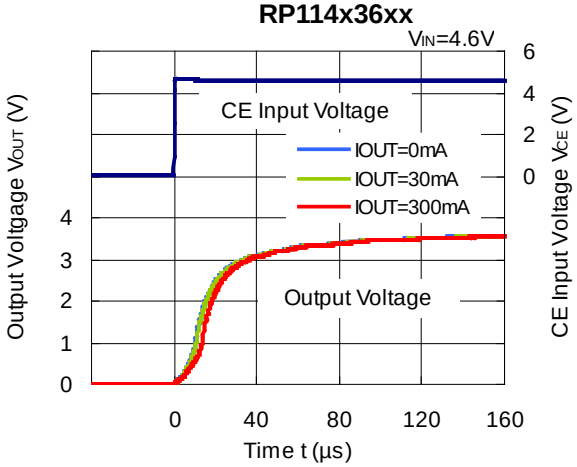
RP114x08xx



RP114x25xx

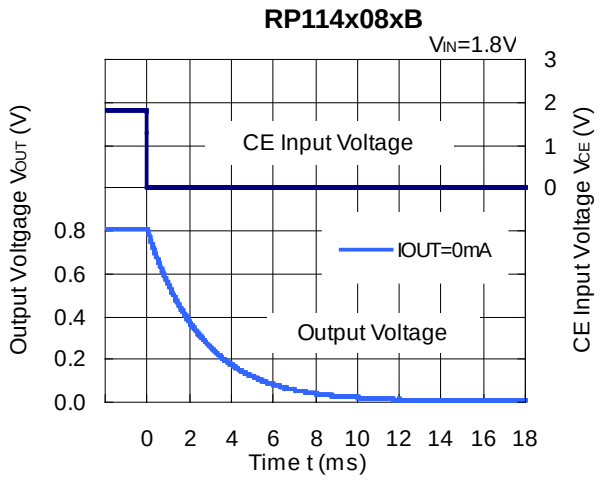


RP114x36xx

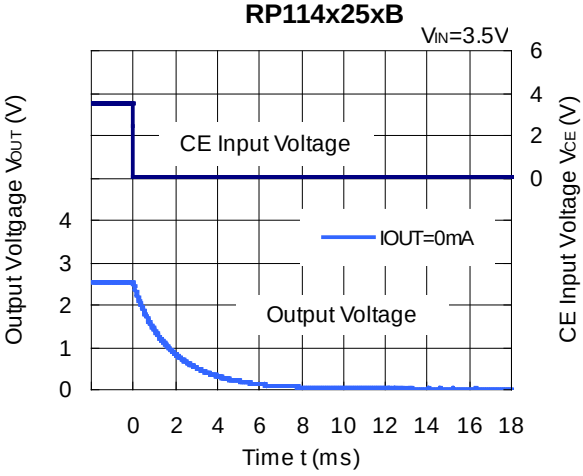


14) Turn Off Speed with CE pin (B version) (C1=1.0µF, C2=1.0µF, Ta=25°C)

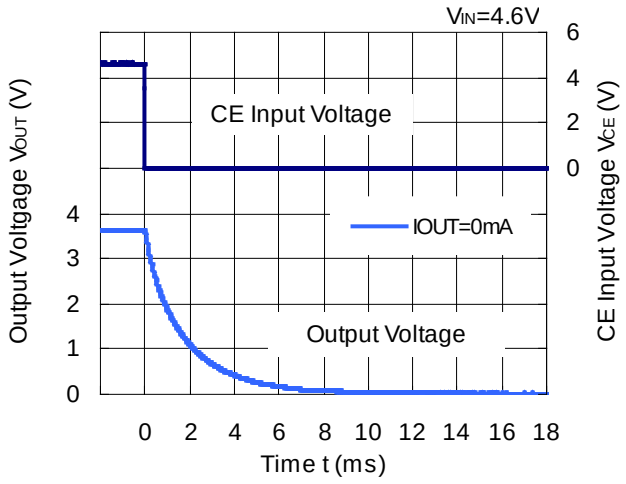
RP114x08xB



RP114x25xB

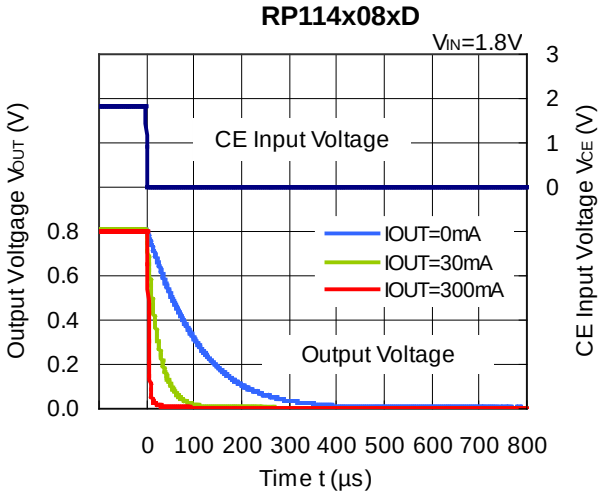


RP114x36xB

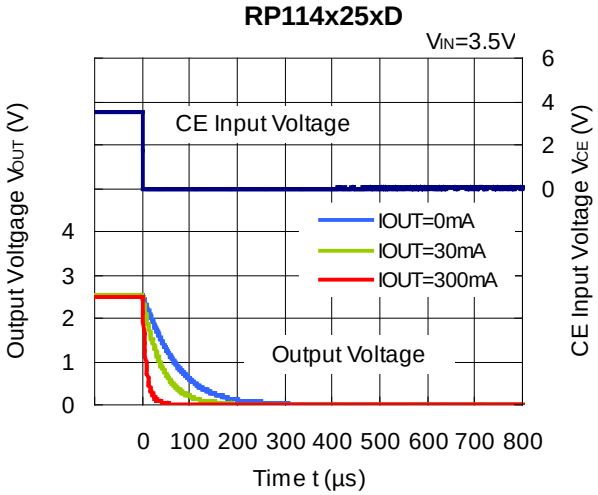


15) Turn Off Speed with CE pin (D version) (C1=1.0µF, C2=1.0µF, Ta=25°C)

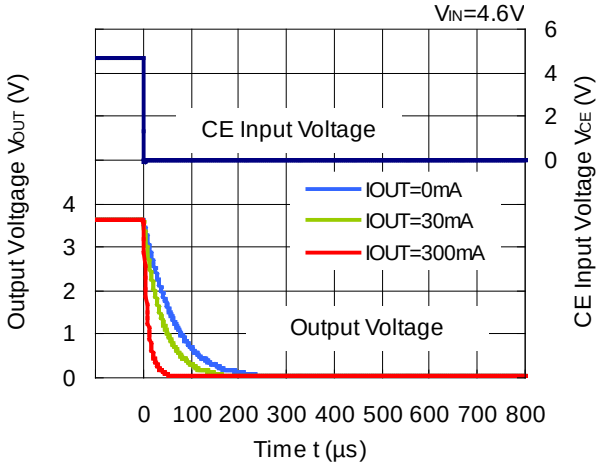
RP114x08xD



RP114x25xD



RP114x36xD



PD-DFN(PL)1010-4-(85125150)-JE-B

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

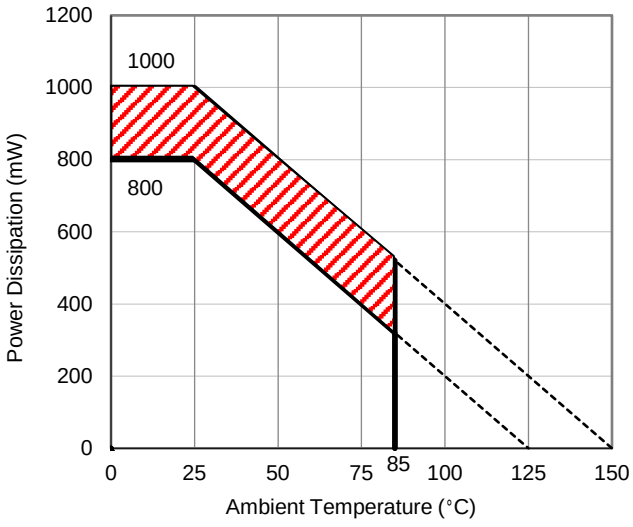
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.2 mm × 21 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

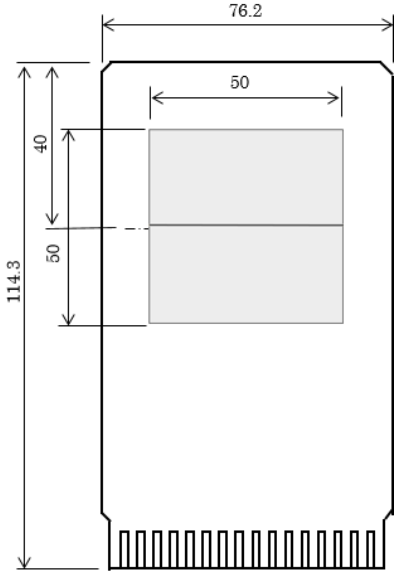
Item	Measurement Result
Power Dissipation	800 mW
Thermal Resistance (θja)	θja = 125°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 58°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



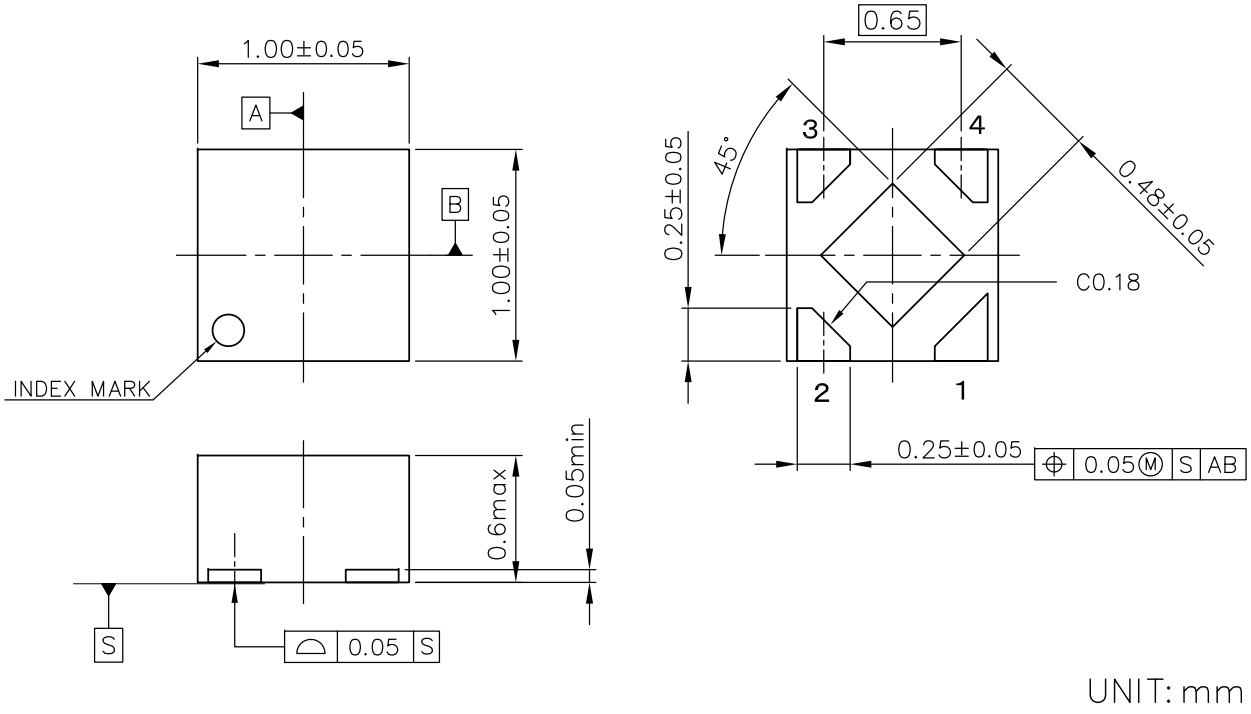
Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

Total Hours of Use	Total Years of Use (4 hours/day)
13,000 hours	9 years



DFN(PL)1010-4 Package Dimensions

PD-DFN(PL)1010-4B-(85125150)-JE-B

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

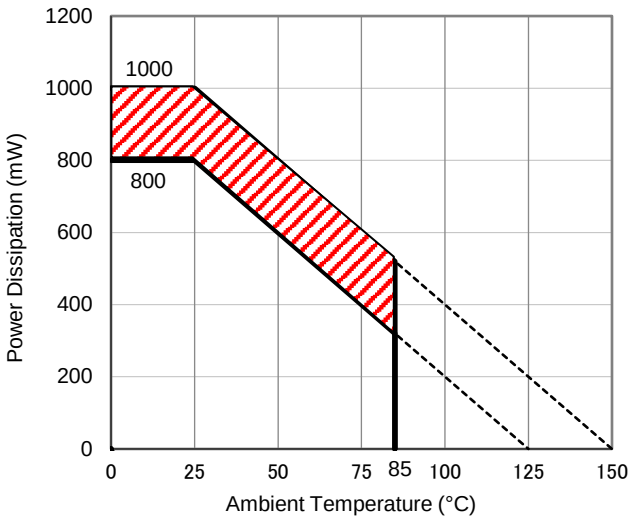
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.2 mm × 21 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

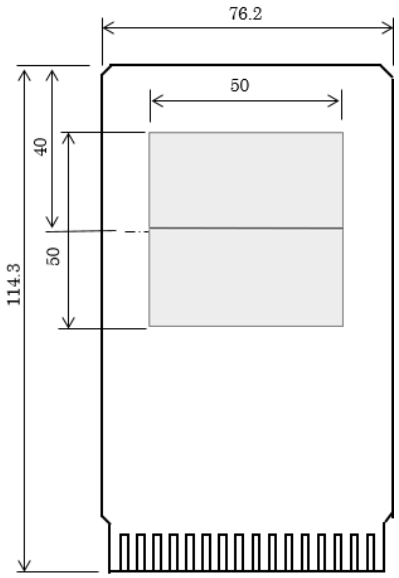
Item	Measurement Result
Power Dissipation	800 mW
Thermal Resistance (θja)	θja = 125°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 58°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature

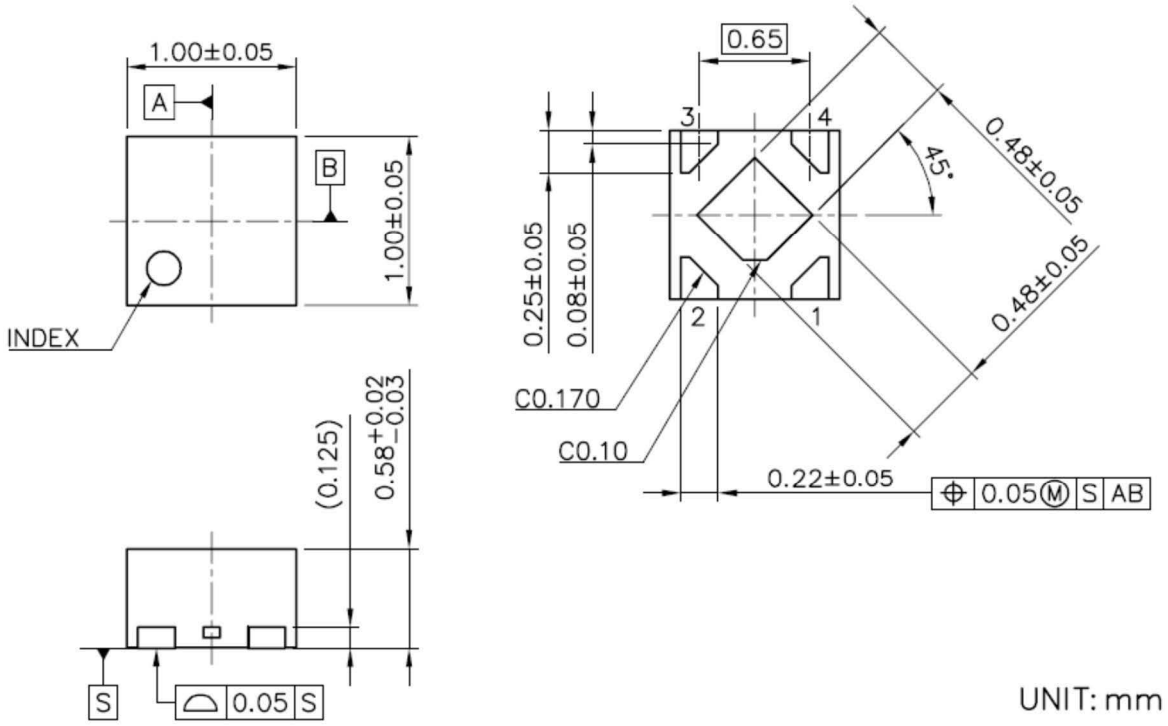


Measurement Board Pattern

The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

Total Hours of Use	Total Years of Use (4 hours/day)
13,000 hours	9 years

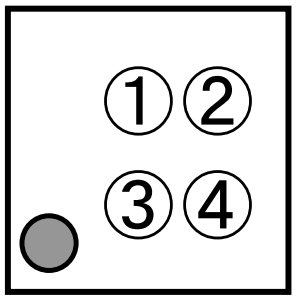
DM-DFN(PL)1010-4B-JE-C



DFN(PL)1010-4B Package Dimensions

MK-RP114K-JE-C

①②: Product Code ⋯ Refer to *Part Marking List*
③④: Lot Number ⋯ Alphanumeric Serial Number



RP114K [DFN(PL)1010-4B], DFN(PL)1010-4 Part Markings

NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or our distributor before attempting to use AOI.

RP114Kxx1B Part Marking List

Product Name	①②	Set Output Voltage
RP114K081B	L 0	0.8V
RP114K091B	L 1	0.9V
RP114K101B	L 2	1.0V
RP114K111B	L 3	1.1V
RP114K121B	L 4	1.2V
RP114K131B	L 5	1.3V
RP114K141B	L 6	1.4V
RP114K151B	L 7	1.5V
RP114K161B	L 8	1.6V
RP114K171B	L 9	1.7V
RP114K181B	M 0	1.8V
RP114K191B	M 1	1.9V
RP114K201B	M 2	2.0V
RP114K211B	M 3	2.1V
RP114K221B	M 4	2.2V
RP114K231B	M 5	2.3V
RP114K241B	M 6	2.4V
RP114K251B	M 7	2.5V
RP114K261B	M 8	2.6V
RP114K271B	M 9	2.7V
RP114K281B	N 0	2.8V
RP114K291B	N 1	2.9V
RP114K301B	N 2	3.0V
RP114K311B	N 3	3.1V
RP114K321B	N 4	3.2V
RP114K331B	N 5	3.3V
RP114K341B	N 6	3.4V
RP114K351B	N 7	3.5V
RP114K361B	N 8	3.6V
RP114K121B5	N 9	1.25V
RP114K181B5	P 0	1.85V
RP114K281B5	P 1	2.85V
RP114K341B5	P 2	3.45V
RP114K101B5	P 3	1.05V
RP114K171B5	P 4	1.75V
RP114K111B5	P 5	1.15V
RP114K131B5	P 6	1.35V
RP114K301B5	P 9	3.05V

RP114Kxx1D Part Marking List

Product Name	①②	Set Output Voltage
RP114K081D	Q 0	0.8V
RP114K091D	Q 1	0.9V
RP114K101D	Q 2	1.0V
RP114K111D	Q 3	1.1V
RP114K121D	Q 4	1.2V
RP114K131D	Q 5	1.3V
RP114K141D	Q 6	1.4V
RP114K151D	Q 7	1.5V
RP114K161D	Q 8	1.6V
RP114K171D	Q 9	1.7V
RP114K181D	R 0	1.8V
RP114K191D	R 1	1.9V
RP114K201D	R 2	2.0V
RP114K211D	R 3	2.1V
RP114K221D	R 4	2.2V
RP114K231D	R 5	2.3V
RP114K241D	R 6	2.4V
RP114K251D	R 7	2.5V
RP114K261D	R 8	2.6V
RP114K271D	R 9	2.7V
RP114K281D	S 0	2.8V
RP114K291D	S 1	2.9V
RP114K301D	S 2	3.0V
RP114K311D	S 3	3.1V
RP114K321D	S 4	3.2V
RP114K331D	S 5	3.3V
RP114K341D	S 6	3.4V
RP114K351D	S 7	3.5V
RP114K361D	S 8	3.6V
RP114K121D5	S 9	1.25V
RP114K181D5	T 0	1.85V
RP114K281D5	T 1	2.85V
RP114K341D5	T 2	3.45V
RP114K101D5	T 3	1.05V
RP114K171D5	T 4	1.75V
RP114K111D5	T 5	1.15V
RP114K131D5	T 6	1.35V
RP114K301D5	T 9	3.05V

PD-SC-88A-(85125150)-JE-B

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

Measurement Conditions

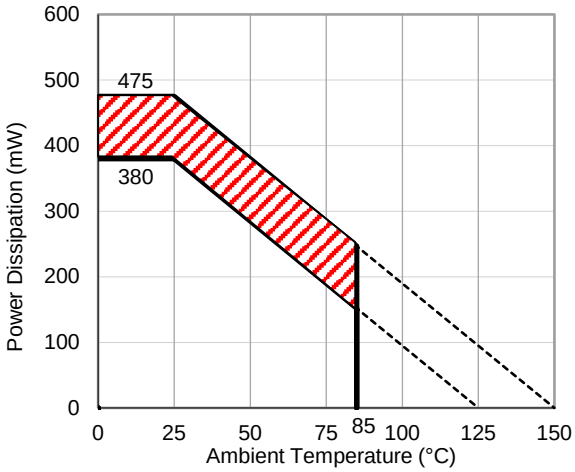
Item	Our Evaluation Board
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Double-Sided Board)
Board Dimensions	40 mm × 40 mm × 1.6 mm
Copper Ratio	Top Side: Approx. 50% Bottom Side: Approx. 50%
Through-holes	ϕ 0.5 mm × 44 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

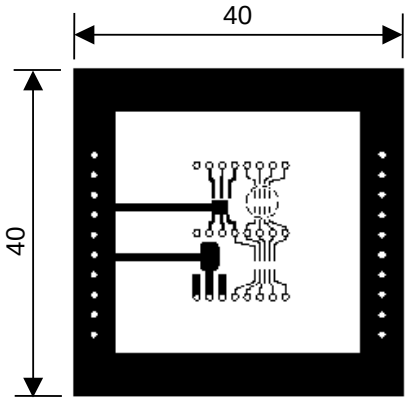
Item	Our Evaluation Board
Power Dissipation	380 mW
Thermal Resistance (θja)	θja = 263°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 75°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



Power Dissipation vs. Ambient Temperature

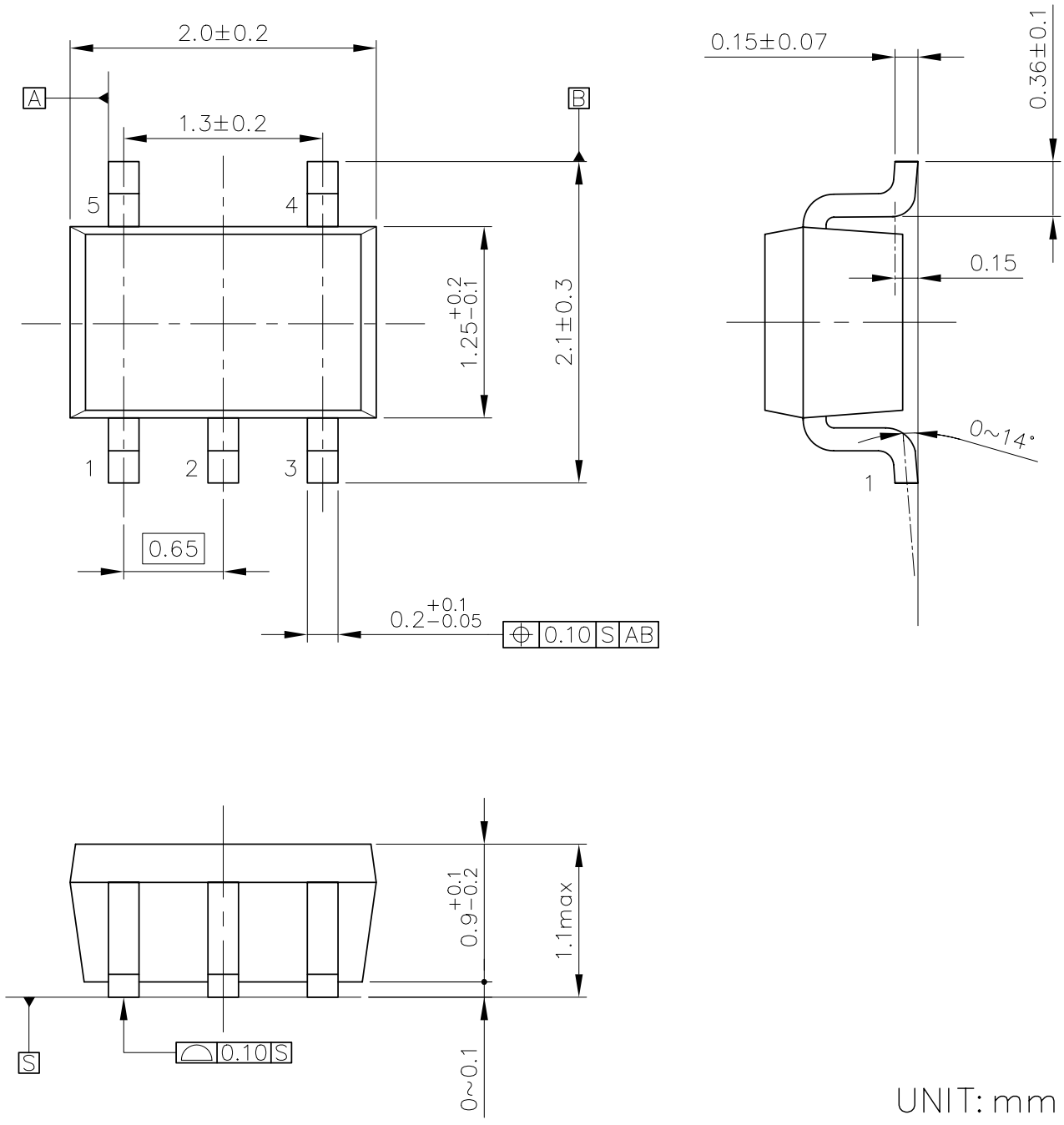


Measurement Board Pattern

The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

Total Hours of Use	Total Years of Use (4 hours/day)
13,000 hours	9 years

DM-SC-88A-JE-A

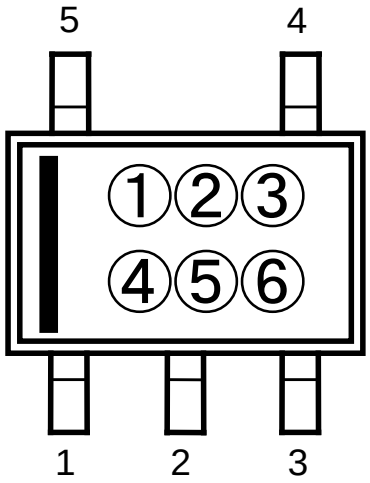


UNIT: mm

SC-88A Package Dimensions

①②③④: Product Code ⋯ Refer to *Part Marking List*

⑤⑥: Lot Number ⋯ Alphanumeric Serial Number



RP114Q (SC-88A) Part Markings

NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or our distributor before attempting to use AOI.

RP114Qxx2B Part Marking List

Product Name	①②③④	Set Output Voltage
RP114Q082B	**A G 0 8**	0.8 V
RP114Q092B	**A G 0 9**	0.9 V
RP114Q102B	**A G 1 0**	1.0 V
RP114Q112B	**A G 1 1**	1.1 V
RP114Q122B	**A G 1 2**	1.2 V
RP114Q132B	**A G 1 3**	1.3 V
RP114Q142B	**A G 1 4**	1.4 V
RP114Q152B	**A G 1 5**	1.5 V
RP114Q162B	**A G 1 6**	1.6 V
RP114Q172B	**A G 1 7**	1.7 V
RP114Q182B	**A G 1 8**	1.8 V
RP114Q192B	**A G 1 9**	1.9 V
RP114Q202B	**A G 2 0**	2.0 V
RP114Q212B	**A G 2 1**	2.1 V
RP114Q222B	**A G 2 2**	2.2 V
RP114Q232B	**A G 2 3**	2.3 V
RP114Q242B	**A G 2 4**	2.4 V
RP114Q252B	**A G 2 5**	2.5 V
RP114Q262B	**A G 2 6**	2.6 V
RP114Q272B	**A G 2 7**	2.7 V
RP114Q282B	**A G 2 8**	2.8 V
RP114Q292B	**A G 2 9**	2.9 V
RP114Q302B	**A G 3 0**	3.0 V
RP114Q312B	**A G 3 1**	3.1 V
RP114Q322B	**A G 3 2**	3.2 V
RP114Q332B	**A G 3 3**	3.3 V
RP114Q342B	**A G 3 4**	3.4 V
RP114Q352B	**A G 3 5**	3.5 V
RP114Q362B	**A G 3 6**	3.6 V
RP114Q122B5	**A G 3 7**	1.25 V
RP114Q182B5	**A G 3 8**	1.85 V
RP114Q282B5	**A G 3 9**	2.85 V
RP114Q342B5	**A G 4 0**	3.45 V
RP114Q102B5	**A G 4 1**	1.05 V
RP114Q302B5	**A G 4 2**	3.05 V

RP114Qxx2D Part Marking List

Product Name	①②③④	Set Output Voltage
RP114Q082D	**A H 0 8**	0.8 V
RP114Q092D	**A H 0 9**	0.9 V
RP114Q102D	**A H 1 0**	1.0 V
RP114Q112D	**A H 1 1**	1.1 V
RP114Q122D	**A H 1 2**	1.2 V
RP114Q132D	**A H 1 3**	1.3 V
RP114Q142D	**A H 1 4**	1.4 V
RP114Q152D	**A H 1 5**	1.5 V
RP114Q162D	**A H 1 6**	1.6 V
RP114Q172D	**A H 1 7**	1.7 V
RP114Q182D	**A H 1 8**	1.8 V
RP114Q192D	**A H 1 9**	1.9 V
RP114Q202D	**A H 2 0**	2.0 V
RP114Q212D	**A H 2 1**	2.1 V
RP114Q222D	**A H 2 2**	2.2 V
RP114Q232D	**A H 2 3**	2.3 V
RP114Q242D	**A H 2 4**	2.4 V
RP114Q252D	**A H 2 5**	2.5 V
RP114Q262D	**A H 2 6**	2.6 V
RP114Q272D	**A H 2 7**	2.7 V
RP114Q282D	**A H 2 8**	2.8 V
RP114Q292D	**A H 2 9**	2.9 V
RP114Q302D	**A H 3 0**	3.0 V
RP114Q312D	**A H 3 1**	3.1 V
RP114Q322D	**A H 3 2**	3.2 V
RP114Q332D	**A H 3 3**	3.3 V
RP114Q342D	**A H 3 4**	3.4 V
RP114Q352D	**A H 3 5**	3.5 V
RP114Q362D	**A H 3 6**	3.6 V
RP114Q122D5	**A H 3 7**	1.25 V
RP114Q182D5	**A H 3 8**	1.85 V
RP114Q282D5	**A H 3 9**	2.85 V
RP114Q342D5	**A H 4 0**	3.45 V
RP114Q102D5	**A H 4 1**	1.05 V
RP114Q302D5	**A H 4 2**	3.05 V

PD-SOT-23-5-(85/125/150)-JE-A

The power dissipation of the package is dependent on PCB material, layout, and environmental conditions. The following measurement conditions are based on JEDEC STD. 51-7.

Measurement Conditions

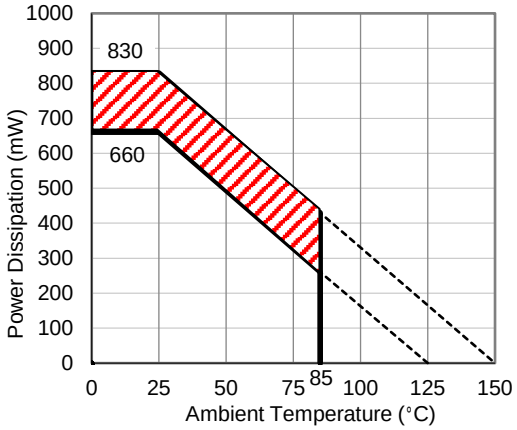
Item	Measurement Conditions
Environment	Mounting on Board (Wind Velocity = 0 m/s)
Board Material	Glass Cloth Epoxy Plastic (Four-Layer Board)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm
Copper Ratio	Outer Layer (First Layer): Less than 95% of 50 mm Square Inner Layers (Second and Third Layers): Approx. 100% of 50 mm Square Outer Layer (Fourth Layer): Approx. 100% of 50 mm Square
Through-holes	ϕ 0.3 mm × 7 pcs

Measurement Result (Ta = 25°C, Tjmax = 125°C)

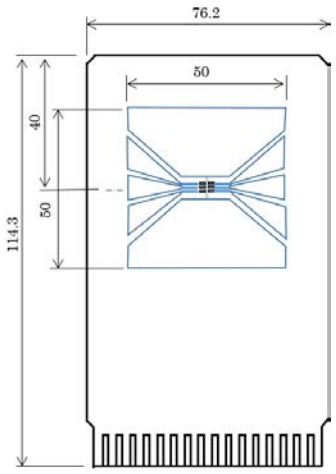
Item	Measurement Result
Power Dissipation	660 mW
Thermal Resistance (θja)	θja = 150°C/W
Thermal Characterization Parameter (ψjt)	ψjt = 51°C/W

θja: Junction-to-Ambient Thermal Resistance

ψjt: Junction-to-Top Thermal Characterization Parameter



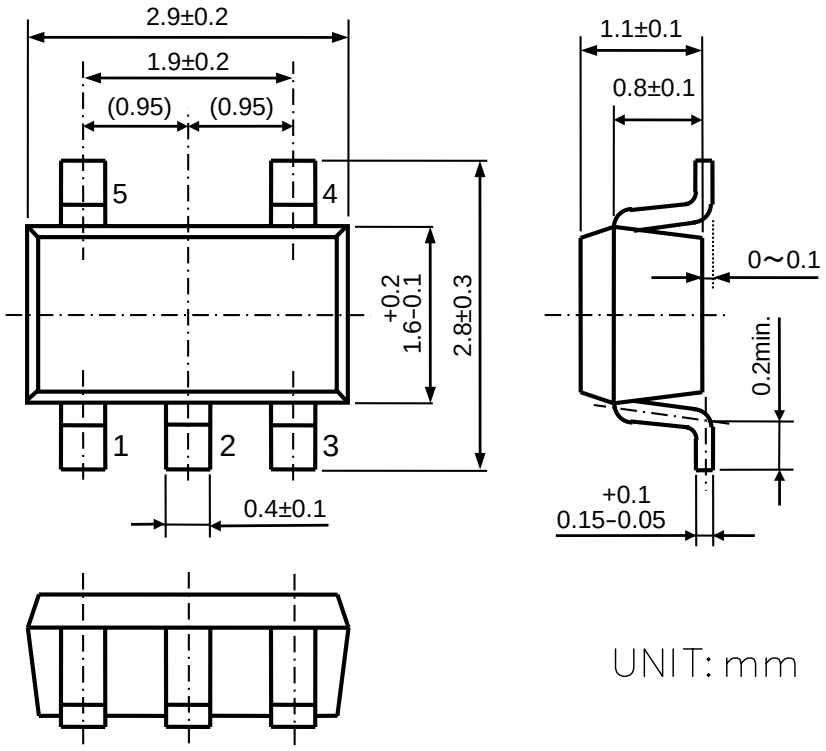
Power Dissipation vs. Ambient Temperature



Measurement Board Pattern

The above graph shows the power dissipation of the package at Tjmax = 125°C and Tjmax = 150°C. Operating the device in the hatched range might have a negative influence on its lifetime. The total hours of use and the total years of use must be limited as follows:

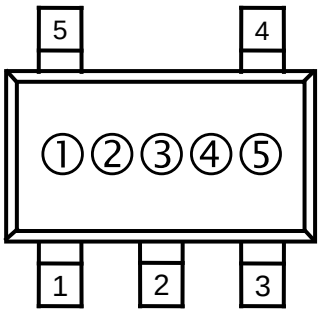
Total Hours of Use	Total Years of Use (4 hours/day)
13,000 hours	9 years



SOT-23-5 Package Dimensions

MK-RP114N-JE-B

①②③: Product Code ⋯ Refer to *Part Marking List*
④⑤: Lot Number ⋯ Alphanumeric Serial Number



RP114N (SOT-23-5) Part Markings

NOTICE
There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact our sales or our distributor before attempting to use AOI.

RP114Nxx1B Part Marking List

Product Name	①②③	Set Output Voltage
RP114N081B	Q A A	0.8 V
RP114N091B	Q A B	0.9 V
RP114N101B	Q A C	1.0 V
RP114N111B	Q A D	1.1 V
RP114N121B	Q A E	1.2 V
RP114N131B	Q A F	1.3 V
RP114N141B	Q A G	1.4 V
RP114N151B	Q A H	1.5 V
RP114N161B	Q A J	1.6 V
RP114N171B	Q A K	1.7 V
RP114N181B	Q A L	1.8 V
RP114N191B	Q A M	1.9 V
RP114N201B	Q A N	2.0 V
RP114N211B	Q A P	2.1 V
RP114N221B	Q A Q	2.2 V
RP114N231B	Q A R	2.3 V
RP114N241B	Q A S	2.4 V
RP114N251B	Q A T	2.5 V
RP114N261B	Q A U	2.6 V
RP114N271B	Q A V	2.7 V
RP114N281B	Q A W	2.8 V
RP114N291B	Q A X	2.9 V
RP114N301B	Q A Y	3.0 V
RP114N311B	Q A Z	3.1 V
RP114N321B	R A A	3.2 V
RP114N331B	R A B	3.3 V
RP114N341B	R A C	3.4 V
RP114N351B	R A D	3.5 V
RP114N361B	R A E	3.6 V
RP114N121B5	R A F	1.25 V
RP114N181B5	R A G	1.85 V
RP114N281B5	R A H	2.85 V
RP114N341B5	R A J	3.45 V
RP114N101B5	R A K	1.05 V
RP114N301B5	R A L	3.05 V

RP114Nxx1D Part Marking List

Product Name	①②③	Set Output Voltage
RP114N081D	Q B A	0.8 V
RP114N091D	Q B B	0.9 V
RP114N101D	Q B C	1.0 V
RP114N111D	Q B D	1.1 V
RP114N121D	Q B E	1.2 V
RP114N131D	Q B F	1.3 V
RP114N141D	Q B G	1.4 V
RP114N151D	Q B H	1.5 V
RP114N161D	Q B J	1.6 V
RP114N171D	Q B K	1.7 V
RP114N181D	Q B L	1.8 V
RP114N191D	Q B M	1.9 V
RP114N201D	Q B N	2.0 V
RP114N211D	Q B P	2.1 V
RP114N221D	Q B Q	2.2 V
RP114N231D	Q B R	2.3 V
RP114N241D	Q B S	2.4 V
RP114N251D	Q B T	2.5 V
RP114N261D	Q B U	2.6 V
RP114N271D	Q B V	2.7 V
RP114N281D	Q B W	2.8 V
RP114N291D	Q B X	2.9 V
RP114N301D	Q B Y	3.0 V
RP114N311D	Q B Z	3.1 V
RP114N321D	R B A	3.2 V
RP114N331D	R B B	3.3 V
RP114N341D	R B C	3.4 V
RP114N351D	R B D	3.5 V
RP114N361D	R B E	3.6 V
RP114N121D5	R B F	1.25 V
RP114N181D5	R B G	1.85 V
RP114N281D5	R B H	2.85 V
RP114N341D5	R B J	3.45 V
RP114N101D5	R B K	1.05 V
RP114N301D5	R B L	3.05 V

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    8-2. Quality Warranty Remedies
    When it has been proved defective due to manufacturing factors as a result of defect analysis by us, we will either deliver a substitute for the defective product or refund the purchase price of the defective product.
    Note that such delivery or refund is sole and exclusive remedies to your company for the defective product.
    8-3. Remedies after Quality Warranty Period
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