50 mA Voltage Regulator (Wide Input Voltage Range) for Automotive Applications

NO. EC-153-150701

OUTLINE

The R1515x series are CMOS-based positive voltage regulator (VR) ICs featuring 50mA output current. The R1515xxxxB has features of high input voltage and ultra-low supply current. A peak current limit circuit, a short current limit circuit, and a thermal shutdown circuit are built in the R1515x series.

The operating temperature is −40°C to 105°C and the maximum input voltage is 36V, the R1515x series are very suitable for power source of car accessories.

The regulator output voltage is fixed in the R1515xxxxB and can be selected with a step of 0.1V in the range of 2.0V to 12.0V. Output voltage accuracy is ±2%.

The packages for these ICs are the SOT-89-5 for space saving and the HSOP-6J for higher power applications.

FEATURES

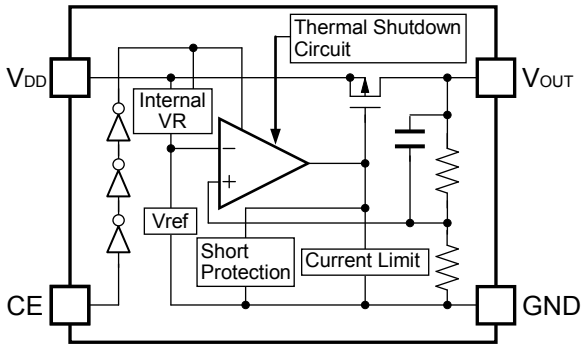
- Input Voltage Range (Maximum Rating)..... 4V to 36V (50V)
- Supply Current ..... Typ. 9μA
- Standby Current..... Typ. 0.1μA
- Temperature-Drift Coefficient of Output Voltage ... Typ. ±100ppm/°C
- Output Current ..... Min. 50mA (V_{IN}=V_{OUT}+3.0V)
- Line Regulation ..... Typ. 0.05%/V
- Output Voltage Accuracy..... ±2%
- Packages SOT-89-5, HSOP-6J
- Output Voltage Range..... 2.0V to 12.0V (0.1V step)
- Built-in Peak Current Limit Circuit
- Built-in Short Current Limit Circuit ..... Typ. 50mA
- Built-in Thermal Shutdown Circuit
- Operating Temperature ..... −40°C to 105°C

APPLICATIONS

- Power source for car accessories such as car audio equipment, car navigation system, and ETC system.
- Power source for ECUs such as EV inverter and battery charge control unit.

BLOCK DIAGRAM

R1515xxxxB



SELECTION GUIDE

The output voltage and the package for the ICs can be selected at the user's request.

Product Name	Package	Quantity per Reel	Pb Free	Halogen Free
R1515HxxxB-T1-#E	SOT-89-5	1,000 pcs	Yes	Yes
R1515SxxxB-E2-#E	HSOP-6J	1,000 pcs	Yes	Yes

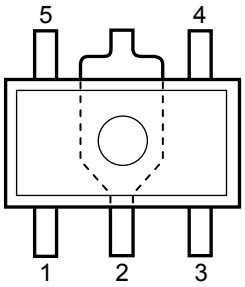
xxx : The output voltage can be designated in the range of 2.0V (020) to 12.0V (120) in 0.1V step.

: Specify Automotive Class Code

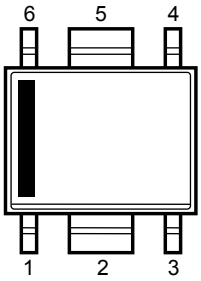
	Operating Temperature Range	Guaranteed Specs Temperature Range	Screening
A	-40°C to 105°C	25°C	High Temperature
J	-40°C to 105°C	25°C	High and Low Temperature

PIN DESCRIPTIONS

● **SOT-89-5**



● **HSOP-6J**



● **SOT-89-5**

Pin No.	Symbol	Description
1	V_{OUT}	Output Pin
2	GND*	Ground Pin
3	CE	Chip Enable Pin ("H" Active)
4	GND*	Ground Pin
5	V_{DD}	Input Pin

∗) The GND pin must be wired together when it is mounted on board.

● **HSOP-6J**

Pin No.	Symbol	Description
1	V_{OUT}	Output Pin
2	GND*	Ground Pin
3	CE	Chip Enable Pin ("H" Active)
4	GND*	Ground Pin
5	GND*	Ground Pin
6	V_{DD}	Input Pin

∗) The GND pin must be wired together when it is mounted on board.

ABSOLUTE MAXIMUM RATINGS

Symbol	Item			Rating	Unit
V_{IN}	Input Voltage			−0.3〜50	V
V_{IN}	Peak Input Voltage[*1]			60	V
V_{CE}	Input Voltage (CE Pin)			−0.3〜V_{IN}+0.3≤50	V
V_{OUT}	Output Voltage			−0.3〜V_{IN}+0.3≤50	V
I_{OUT}	Output Current			150	mA
P_D	Power Dissipation[*2]	SOT-89-5	Standard Land Pattern	900	mW
			High Wattage Land Pattern	1300	
		HSOP-6J	Standard Land Pattern	1700	
			Ultra High Wattage Land Pattern	2700	
Tj	Junction Temperature			−40 to 125	°C
Tstg	Storage Temperature Range			−55 to 125	°C

[*1] Duration time: 200ms
[*2] Refer to *PACKAGE INFORMATION* for detailed information.

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 is not assured.

RECOMMENDED OPERATING CONDITIONS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	4 to 36	V
Ta	Operating Temperature Range	−40 to 105	°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 conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

ELECTRICAL CHARACTERISTICS

The specifications surrounded by ☐ are guaranteed by design engineering at -40°C ≤ Ta ≤ 105 °C.

R1515xxxxB (Ta=25°C)

Symbol	Item	Conditions		Min.	Typ.	Max.	Unit
I_{SS}	Supply Current	V_{IN}=V_{OUT}+3.0V, I_{OUT}=0mA			9	20	μA
$I_{standby}$	Standby Current	V_{IN}=36V, V_{CE}=0V			0.1	1.0	μA
V_{OUT}	Output Voltage	V_{IN}=V_{OUT}+3.0V, I_{OUT}=1mA	Ta = 25°C	×0.98		×1.02	V
			−40°C ≤ Ta ≤ 105°C	×0.97		×1.03	V
I_{OUT}	Output Current	V_{IN}=V_{OUT}+3.0V		50			mA
$\Delta V_{OUT}/\Delta I_{OUT}$	Load Regulation	V_{IN}=V_{OUT}+3.0V, 1mA ≤ I_{OUT} ≤ 40mA		Refer to the *Product-specific Electrical Characteristics*			
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	V_{OUT}+1.5V ≤ V_{IN} ≤ 36V, I_{OUT}=1mA			0.05	0.20	%/V
V_{DIF}	Dropout Voltage	I_{OUT}=20mA		Refer to the *Product-specific Electrical Characteristics*			
I_{SC}	Short Current Limit	V_{OUT}=0V			50		mA
V_{CEH}	CE Input Voltage "H"			1.5		V_{IN}	V
V_{CEL}	CE Input Voltage "L"			0		0.3	V
T_{TSD}	Thermal Shutdown Temperature	Junction Temperature			150		°C
T_{TSR}	Thermal Shutdown Released Temperature	Junction Temperature			125		°C

All test items listed under Electrical Characteristics are done under the pulse load condition (Tj ≈ Ta = 25°C).

Product-specific Electrical Characteristics

The specifications surrounded by ☐ are guaranteed by design engineering at -40°C ≤ Ta ≤ 105 °C

(Ta = 25°C)

Product Name	V_{OUT} [V]						$\Delta V_{OUT}/\Delta I_{OUT}$ [mV]		V_{DIF} [V]		
	Ta = 25°C			−40°C ≤ Ta ≤ 105°C					TYP.	Ta = 25°C	−40°C ≤ Ta ≤ 105°C
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.		MAX.	MAX.
R1515x020B	1.960	2.000	2.040	1.940	2.000	2.060				2.00	2.00
R1515x021B	2.058	2.100	2.142	2.037	2.100	2.163				1.90	1.90
R1515x022B	2.156	2.200	2.244	2.134	2.200	2.266				1.80	1.80
R1515x023B	2.254	2.300	2.346	2.231	2.300	2.369				1.70	1.70
R1515x024B	2.352	2.400	2.448	2.328	2.400	2.472				1.60	1.60
R1515x025B	2.450	2.500	2.550	2.425	2.500	2.575				1.50	1.50
R1515x026B	2.548	2.600	2.652	2.522	2.600	2.678				1.40	1.40
R1515x027B	2.646	2.700	2.754	2.619	2.700	2.781				1.30	1.30
R1515x028B	2.744	2.800	2.856	2.716	2.800	2.884			−	1.20	1.20
R1515x029B	2.842	2.900	2.958	2.813	2.900	2.987				1.10	1.10
R1515x030B	2.940	3.000	3.060	2.910	3.000	3.090				1.00	1.00
R1515x031B	3.038	3.100	3.162	3.007	3.100	3.193				0.90	0.90
R1515x032B	3.136	3.200	3.264	3.104	3.200	3.296				0.80	0.80
R1515x033B	3.234	3.300	3.366	3.201	3.300	3.399				0.70	0.70
R1515x034B	3.332	3.400	3.468	3.298	3.400	3.502	10	25		0.60	0.70
R1515x035B	3.430	3.500	3.570	3.395	3.500	3.605				0.50	0.60
R1515x036B	3.528	3.600	3.672	3.492	3.600	3.708				0.40	0.60
R1515x037B	3.626	3.700	3.774	3.589	3.700	3.811					
R1515x038B	3.724	3.800	3.876	3.686	3.800	3.914			0.35	0.60	0.60
R1515x039B	3.822	3.900	3.978	3.783	3.900	4.017					
R1515x040B	3.920	4.000	4.080	3.880	4.000	4.120					
R1515x041B	4.018	4.100	4.182	3.977	4.100	4.223					
R1515x042B	4.116	4.200	4.284	4.074	4.200	4.326					
R1515x043B	4.214	4.300	4.386	4.171	4.300	4.429					
R1515x044B	4.312	4.400	4.488	4.268	4.400	4.532					
R1515x045B	4.410	4.500	4.590	4.365	4.500	4.635			0.25	0.40	0.50
R1515x046B	4.508	4.600	4.692	4.462	4.600	4.738					
R1515x047B	4.606	4.700	4.794	4.559	4.700	4.841					
R1515x048B	4.704	4.800	4.896	4.656	4.800	4.944					
R1515x049B	4.802	4.900	4.998	4.753	4.900	5.047					

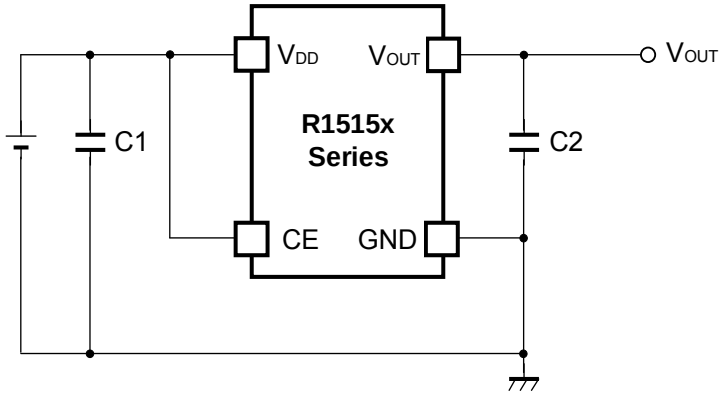
(Ta=25°C)

Product Name	V_{OUT} [V]						$\Delta V_{OUT}/\Delta I_{OUT}$ [mV]		V_{DIF} [V]		
	Ta = 25°C			−40°C ≤ Ta ≤ 105°C					TYP.	Ta = 25°C	−40°C ≤ Ta ≤ 105°C
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.		MAX.	MAX.
R1515x050B	4.900	5.000	5.100	4.850	5.000	5.150					
R1515x051B	4.998	5.100	5.202	4.947	5.100	5.253					
R1515x052B	5.096	5.200	5.304	5.044	5.200	5.356					
R1515x053B	5.194	5.300	5.406	5.141	5.300	5.459					
R1515x054B	5.292	5.400	5.508	5.238	5.400	5.562					
R1515x055B	5.390	5.500	5.610	5.335	5.500	5.665					
R1515x056B	5.488	5.600	5.712	5.432	5.600	5.768					
R1515x057B	5.586	5.700	5.814	5.529	5.700	5.871					
R1515x058B	5.684	5.800	5.916	5.626	5.800	5.974					
R1515x059B	5.782	5.900	6.018	5.723	5.900	6.077					
R1515x060B	5.880	6.000	6.120	5.820	6.000	6.180					
R1515x061B	5.978	6.100	6.222	5.917	6.100	6.283					
R1515x062B	6.076	6.200	6.324	6.014	6.200	6.386					
R1515x063B	6.174	6.300	6.426	6.111	6.300	6.489					
R1515x064B	6.272	6.400	6.528	6.208	6.400	6.592					
R1515x065B	6.370	6.500	6.630	6.305	6.500	6.695					
R1515x066B	6.468	6.600	6.732	6.402	6.600	6.798					
R1515x067B	6.566	6.700	6.834	6.499	6.700	6.901					
R1515x068B	6.664	6.800	6.936	6.596	6.800	7.004					
R1515x069B	6.762	6.900	7.038	6.693	6.900	7.107					
R1515x070B	6.860	7.000	7.140	6.790	7.000	7.210	20	35	0.20	0.35	0.40
R1515x071B	6.958	7.100	7.242	6.887	7.100	7.313					
R1515x072B	7.056	7.200	7.344	6.984	7.200	7.416					
R1515x073B	7.154	7.300	7.446	7.081	7.300	7.519					
R1515x074B	7.252	7.400	7.548	7.178	7.400	7.622					
R1515x075B	7.350	7.500	7.650	7.275	7.500	7.725					
R1515x076B	7.448	7.600	7.752	7.372	7.600	7.828					
R1515x077B	7.546	7.700	7.854	7.469	7.700	7.931					
R1515x078B	7.644	7.800	7.956	7.566	7.800	8.034					
R1515x079B	7.742	7.900	8.058	7.663	7.900	8.137					
R1515x080B	7.840	8.000	8.160	7.760	8.000	8.240					
R1515x081B	7.938	8.100	8.262	7.857	8.100	8.343					
R1515x082B	8.036	8.200	8.364	7.954	8.200	8.446					
R1515x083B	8.134	8.300	8.466	8.051	8.300	8.549					
R1515x084B	8.232	8.400	8.568	8.148	8.400	8.652					
R1515x085B	8.330	8.500	8.670	8.245	8.500	8.755					
R1515x086B	8.428	8.600	8.772	8.342	8.600	8.858					
R1515x087B	8.526	8.700	8.874	8.439	8.700	8.961					
R1515x088B	8.624	8.800	8.976	8.536	8.800	9.064					
R1515x089B	8.722	8.900	9.078	8.633	8.900	9.167					

(Ta = 25°C)

Product Name	V_{OUT} [V]						$\Delta V_{OUT}/\Delta I_{OUT}$ [mV]		V_{DIF} [V]		
	Ta = 25°C			−40°C ≤ Ta ≤ 105°C					TYP.	Ta = 25°C	−40°C ≤ Ta ≤ 105°C
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	TYP.	MAX.		MAX.	MAX.
R1515x090B	8.820	9.000	9.180	8.730	9.000	9.270					
R1515x091B	8.918	9.100	9.282	8.827	9.100	9.373					
R1515x092B	9.016	9.200	9.384	8.924	9.200	9.476					
R1515x093B	9.114	9.300	9.486	9.021	9.300	9.579					
R1515x094B	9.212	9.400	9.588	9.118	9.400	9.682					
R1515x095B	9.310	9.500	9.690	9.215	9.500	9.785					
R1515x096B	9.408	9.600	9.792	9.312	9.600	9.888					
R1515x097B	9.506	9.700	9.894	9.409	9.700	9.991					
R1515x098B	9.604	9.800	9.996	9.506	9.800	10.094					
R1515x099B	9.702	9.900	10.098	9.603	9.900	10.197					
R1515x100B	9.800	10.000	10.200	9.700	10.000	10.300					
R1515x101B	9.898	10.100	10.302	9.797	10.100	10.403					
R1515x102B	9.996	10.200	10.404	9.894	10.200	10.506					
R1515x103B	10.094	10.300	10.506	9.991	10.300	10.609					
R1515x104B	10.192	10.400	10.608	10.088	10.400	10.712					
R1515x105B	10.290	10.500	10.710	10.185	10.500	10.815	20	35	0.20	0.35	0.40
R1515x106B	10.388	10.600	10.812	10.282	10.600	10.918					
R1515x107B	10.486	10.700	10.914	10.379	10.700	11.021					
R1515x108B	10.584	10.800	11.016	10.476	10.800	11.124					
R1515x109B	10.682	10.900	11.118	10.573	10.900	11.227					
R1515x110B	10.780	11.000	11.220	10.670	11.000	11.330					
R1515x111B	10.878	11.100	11.322	10.767	11.100	11.433					
R1515x112B	10.976	11.200	11.424	10.864	11.200	11.536					
R1515x113B	11.074	11.300	11.526	10.961	11.300	11.639					
R1515x114B	11.172	11.400	11.628	11.058	11.400	11.742					
R1515x115B	11.270	11.500	11.730	11.155	11.500	11.845					
R1515x116B	11.368	11.600	11.832	11.252	11.600	11.948					
R1515x117B	11.466	11.700	11.934	11.349	11.700	12.051					
R1515x118B	11.564	11.800	12.036	11.446	11.800	12.154					
R1515x119B	11.662	11.900	12.138	11.543	11.900	12.257					
R1515x120B	11.760	12.000	12.240	11.640	12.000	12.360					

TYPICAL APPLICATION



External Parts Example:

C1	0.1μF (Ceramic)
C2	0.1μF (Ceramic)

TECHNICAL NOTES

When using these ICs, consider the following points:

Phase Compensation

Phase Compensation of the R1515x Series has been made internally for stable operation even though the load current would vary. Therefore, without the capacitors, C1 and C2, the output voltage is regulated, however, for more stable operation, use capacitors as C1 and C2. Especially, if the input line is long and impedance is high, C1 is necessary. Moreover, if you use rather large C2, transient response will be improved. Recommended value is in the range from 0.1μF to 10μF. Wiring should be made as short as possible.

Connect the capacitor, C1 between V_{DD} pin and GND pin and C2 between V_{OUT} and GND as close as possible.

GND wiring of mounting on board

No.2 pin and No.4 pin of SOT-89-5 package must be wired to the GND plane. No.2 pin, No.4 pin and No.5 pin of HSOP-6J package must be wired to the GND plane when it is mounted on board.

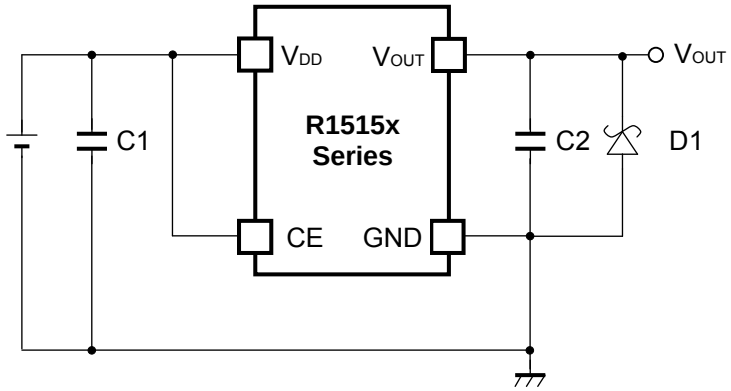
Thermal Shutdown

Thermal shutdown function is included in the R1515x Series, if the junction temperature is equal or more than +150°C (Typ.), the operation of regulator would stop. After that, when the junction temperature is equal or less than +125°C (Typ.), the operation of regulator would restart. Unless the cause of rising temperature would remove, the regulator repeats on and off, and output waveform would be like consecutive pulses.

Chip Enable Circuit

Do not make voltage level of chip enable pin keep floating level, or in between V_{CEH} and V_{CEL}. Otherwise, the output voltage would be unstable or indefinite, or unexpected current would flow internally.

TYPICAL APPLICATION FOR IC CHIP BREAKDOWN PREVENTION



When a sudden surge of electrical current travels along the V_{OUT} pin and GND due to a short-circuit, electrical resonance of a circuit involving an output capacitor (C2) and a short circuit inductor generates a negative voltage and may damage the device or the load devices. Connecting a schottky diode (D1) between the V_{OUT} pin and GND has the effect of preventing damage to them.

PACKAGE INFORMATION

POWER DISSIPATION (SOT-89-5)

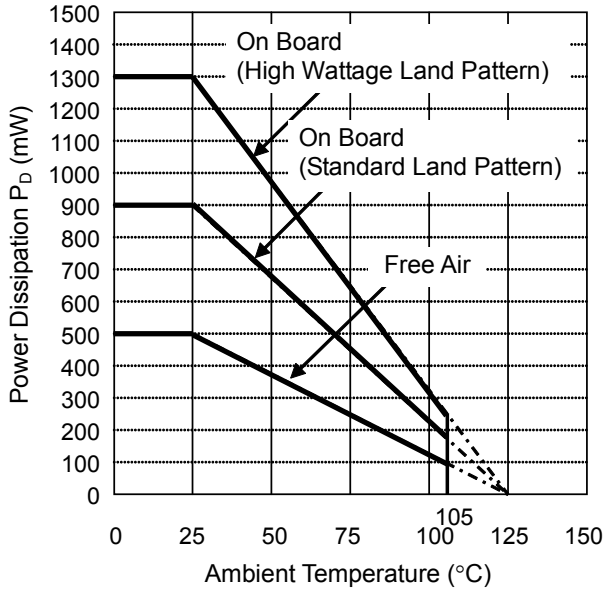
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions (SOT-89-5)

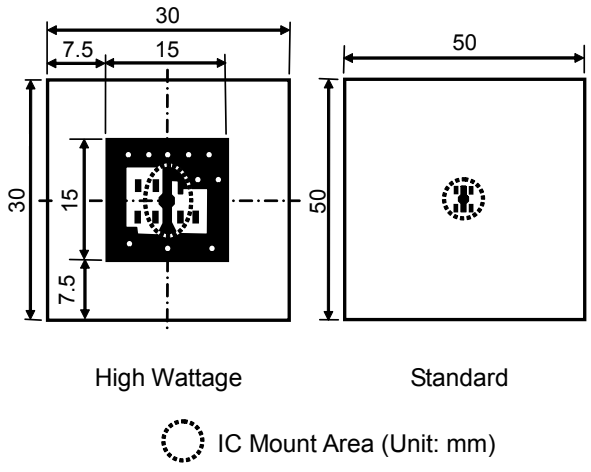
	High Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on board (Wind velocity = 0 m/s)	Mounting on board (Wind velocity = 0 m/s)
Board Material	Glass cloth epoxy plastic (Double sided)	Glass cloth epoxy plastic (Double sided)
Board Dimensions	30 mm x 30 mm x 1.6 mm	50 mm x 50 mm x 1.6 mm
Copper Ratio	Top side: Approx. 20% , Back side: Approx. 100%	Top side: Approx. 10% , Back side: Approx. 100%
Through-hole	ϕ0.85 mm x 10 pcs	-

Measurement Result (SOT-89-5) (Ta = 25°C, Tjmax = 125°C)

	High Wattage Land Pattern	Standard Land Pattern	Free Air
Power Dissipation	1300 mW	900 mW	500 mW
Thermal Resistance	77°C/W	111°C/W	200°C/W

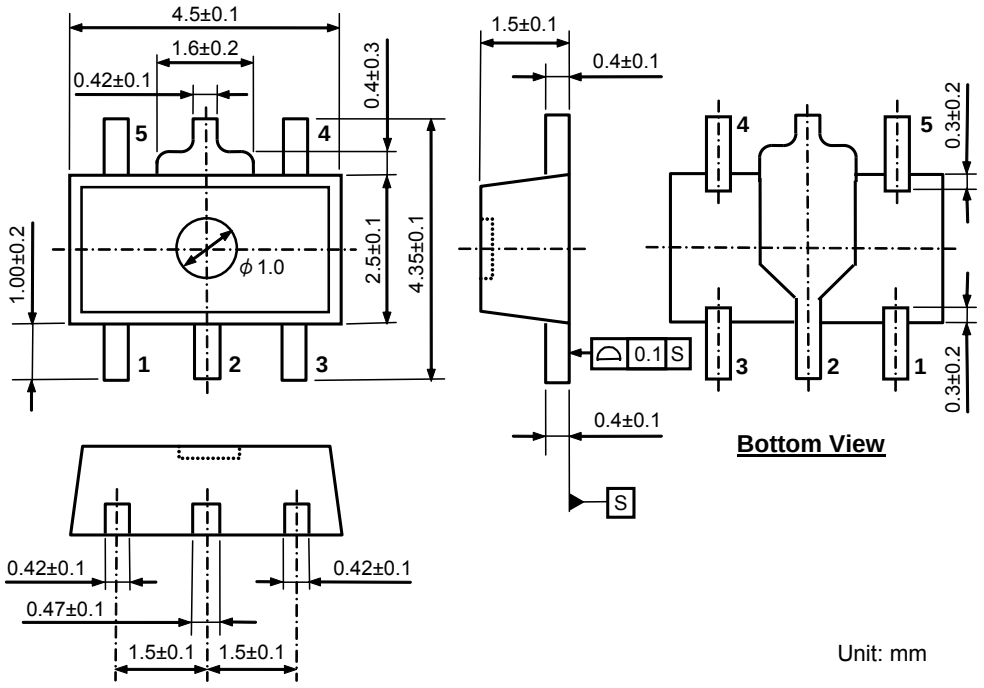


Power Dissipation vs. Ambience Temperature (SOT-89-5)



Measurement Board Pattern (SOT-89-5)

PACKAGE DIMENSIONS (SOT-89-5)

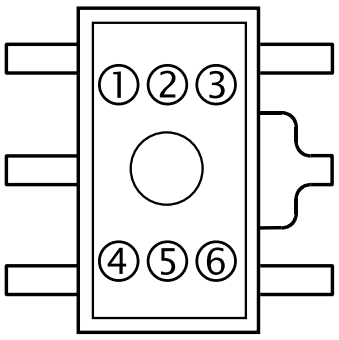


Unit: mm

MARK SPECIFICATION (SOT-89-5)

①②③④: Product Code … **Refer to *R1515H MARK SPECIFICATION TABLE***

⑤⑥: Lot Number … Alphanumeric Serial Number



R1515H MARK SPECIFICATION TABLE (SOT-89-5)

Product Name	①②③④	V_{SET}
R1515H020B	N 0 2 0	2.0 V
R1515H021B	N 0 2 1	2.1 V
R1515H022B	N 0 2 2	2.2 V
R1515H023B	N 0 2 3	2.3 V
R1515H024B	N 0 2 4	2.4 V
R1515H025B	N 0 2 5	2.5 V
R1515H026B	N 0 2 6	2.6 V
R1515H027B	N 0 2 7	2.7 V
R1515H028B	N 0 2 8	2.8 V
R1515H029B	N 0 2 9	2.9 V
R1515H030B	N 0 3 0	3.0 V
R1515H031B	N 0 3 1	3.1 V
R1515H032B	N 0 3 2	3.2 V
R1515H033B	N 0 3 3	3.3 V
R1515H034B	N 0 3 4	3.4 V
R1515H035B	N 0 3 5	3.5 V
R1515H036B	N 0 3 6	3.6 V
R1515H037B	N 0 3 7	3.7 V
R1515H038B	N 0 3 8	3.8 V
R1515H039B	N 0 3 9	3.9 V
R1515H040B	N 0 4 0	4.0 V
R1515H041B	N 0 4 1	4.1 V
R1515H042B	N 0 4 2	4.2 V
R1515H043B	N 0 4 3	4.3 V
R1515H044B	N 0 4 4	4.4 V
R1515H045B	N 0 4 5	4.5 V
R1515H046B	N 0 4 6	4.6 V
R1515H047B	N 0 4 7	4.7 V
R1515H048B	N 0 4 8	4.8 V
R1515H049B	N 0 4 9	4.9 V
R1515H050B	N 0 5 0	5.0 V
R1515H051B	N 0 5 1	5.1 V
R1515H052B	N 0 5 2	5.2 V
R1515H053B	N 0 5 3	5.3 V
R1515H054B	N 0 5 4	5.4 V
R1515H055B	N 0 5 5	5.5 V
R1515H056B	N 0 5 6	5.6 V
R1515H057B	N 0 5 7	5.7 V
R1515H058B	N 0 5 8	5.8 V
R1515H059B	N 0 5 9	5.9 V

Product Name	①②③④	V_{SET}
R1515H060B	N 0 6 0	6.0 V
R1515H061B	N 0 6 1	6.1 V
R1515H062B	N 0 6 2	6.2 V
R1515H063B	N 0 6 3	6.3 V
R1515H064B	N 0 6 4	6.4 V
R1515H065B	N 0 6 5	6.5 V
R1515H066B	N 0 6 6	6.6 V
R1515H067B	N 0 6 7	6.7 V
R1515H068B	N 0 6 8	6.8 V
R1515H069B	N 0 6 9	6.9 V
R1515H070B	N 0 7 0	7.0 V
R1515H071B	N 0 7 1	7.1 V
R1515H072B	N 0 7 2	7.2 V
R1515H073B	N 0 7 3	7.3 V
R1515H074B	N 0 7 4	7.4 V
R1515H075B	N 0 7 5	7.5 V
R1515H076B	N 0 7 6	7.6 V
R1515H077B	N 0 7 7	7.7 V
R1515H078B	N 0 7 8	7.8 V
R1515H079B	N 0 7 9	7.9 V
R1515H080B	N 0 8 0	8.0 V
R1515H081B	N 0 8 1	8.1 V
R1515H082B	N 0 8 2	8.2 V
R1515H083B	N 0 8 3	8.3 V
R1515H084B	N 0 8 4	8.4 V
R1515H085B	N 0 8 5	8.5 V
R1515H086B	N 0 8 6	8.6 V
R1515H087B	N 0 8 7	8.7 V
R1515H088B	N 0 8 8	8.8 V
R1515H089B	N 0 8 9	8.9 V
R1515H090B	N 0 9 0	9.0 V
R1515H091B	N 0 9 1	9.1 V
R1515H092B	N 0 9 2	9.2 V
R1515H093B	N 0 9 3	9.3 V
R1515H094B	N 0 9 4	9.4 V
R1515H095B	N 0 9 5	9.5 V
R1515H096B	N 0 9 6	9.6 V
R1515H097B	N 0 9 7	9.7 V
R1515H098B	N 0 9 8	9.8 V
R1515H099B	N 0 9 9	9.9 V

Product Name	①②③④	V_{SET}
R1515H100B	N 1 0 0	10.0 V
R1515H101B	N 1 0 1	10.1 V
R1515H102B	N 1 0 2	10.2 V
R1515H103B	N 1 0 3	10.3 V
R1515H104B	N 1 0 4	10.4 V
R1515H105B	N 1 0 5	10.5 V
R1515H106B	N 1 0 6	10.6 V
R1515H107B	N 1 0 7	10.7 V
R1515H108B	N 1 0 8	10.8 V
R1515H109B	N 1 0 9	10.9 V
R1515H110B	N 1 1 0	11.0 V
R1515H111B	N 1 1 1	11.1 V
R1515H112B	N 1 1 2	11.2 V
R1515H113B	N 1 1 3	11.3 V
R1515H114B	N 1 1 4	11.4 V
R1515H115B	N 1 1 5	11.5 V
R1515H116B	N 1 1 6	11.6 V
R1515H117B	N 1 1 7	11.7 V
R1515H118B	N 1 1 8	11.8 V
R1515H119B	N 1 1 9	11.9 V
R1515H120B	N 1 2 0	12.0 V

POWER DISSIPATION (HSOP-6J)

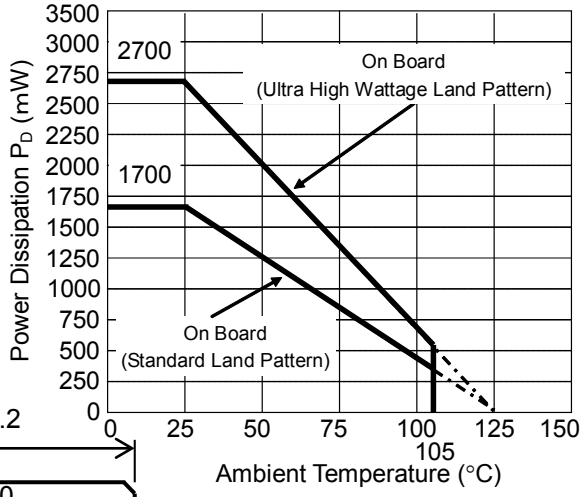
Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

Measurement Conditions

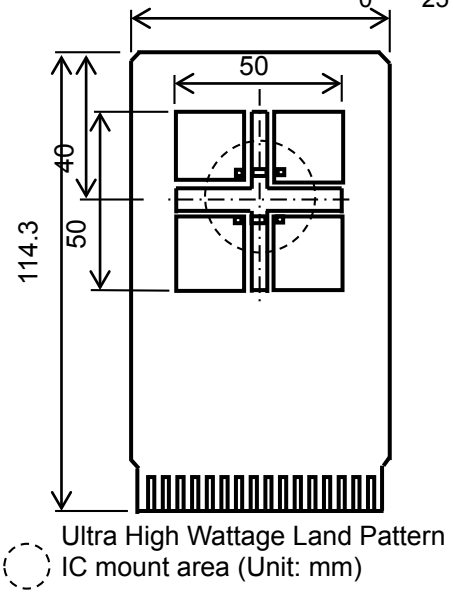
	Ultra High Wattage Land Pattern	Standard Land Pattern
Environment	Mounting on Board (Wind velocity = 0 m/s)	Mounting on Board (Wind velocity = 0 m/s)
Board Material	Glass cloth epoxy plastic (4 Layers)	Glass cloth epoxy plastic (2 Layers)
Board Dimensions	76.2 mm × 114.3 mm × 0.8 mm	50 mm × 50 mm × 1.6 mm
Copper Ratio	96%	50%
Through-hole	ϕ0.3 mm × 28 pcs	ϕ0.5 mm × 24 pcs

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

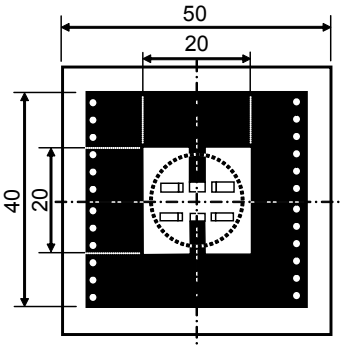
	Ultra High Wattage Land Pattern	Standard Land Pattern	Free Air
Power Dissipation	2700 mW	1700 mW	540 mW
Thermal Resistance	37°C/W	59°C/W	185°C/W



Power Dissipation



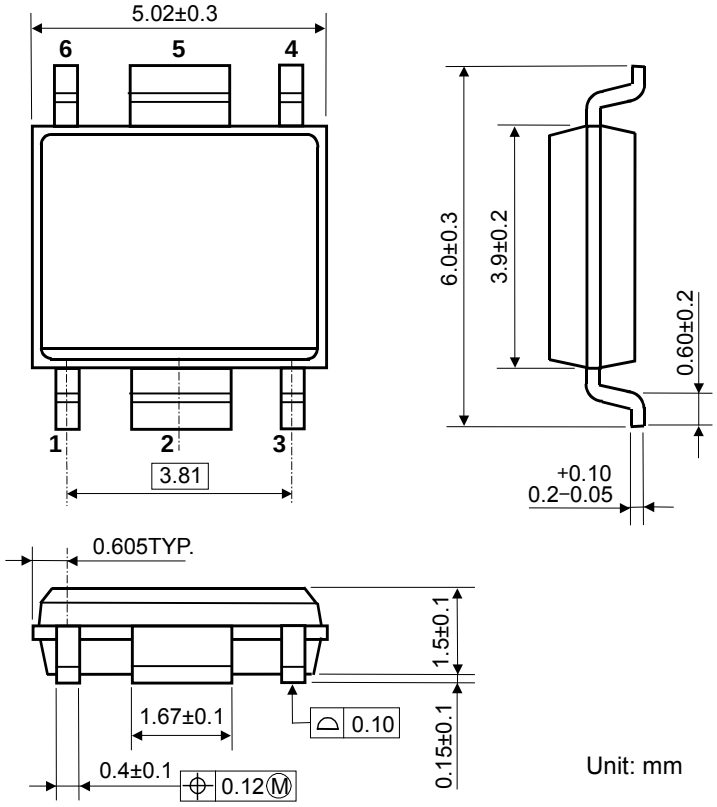
Ultra High Wattage Land Pattern
IC mount area (Unit: mm)



Standard

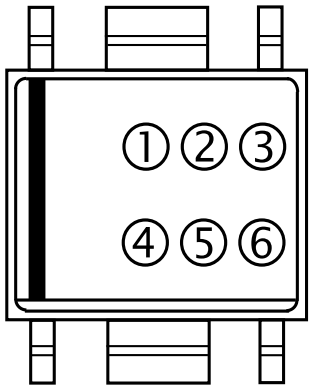
Measurement Board Pattern
IC Mount Area (Unit: mm)

PACKAGE DIMENSIONS (HSOP-6J)



MARK SPECIFICATION (HSOP-6J)

①②③④: Product Code … **Refer to *R1515S MARK SPECIFICATION TABLE***
⑤⑥: Lot Number … Alphanumeric Serial Number



R1515S MARK SPECIFICATION TABLE (HSOP-6J)

Product Name	①②③④	V_{SET}
R1515S020B	F 0 2 0	2.0 V
R1515S021B	F 0 2 1	2.1 V
R1515S022B	F 0 2 2	2.2 V
R1515S023B	F 0 2 3	2.3 V
R1515S024B	F 0 2 4	2.4 V
R1515S025B	F 0 2 5	2.5 V
R1515S026B	F 0 2 6	2.6 V
R1515S027B	F 0 2 7	2.7 V
R1515S028B	F 0 2 8	2.8 V
R1515S029B	F 0 2 9	2.9 V
R1515S030B	F 0 3 0	3.0 V
R1515S031B	F 0 3 1	3.1 V
R1515S032B	F 0 3 2	3.2 V
R1515S033B	F 0 3 3	3.3 V
R1515S034B	F 0 3 4	3.4 V
R1515S035B	F 0 3 5	3.5 V
R1515S036B	F 0 3 6	3.6 V
R1515S037B	F 0 3 7	3.7 V
R1515S038B	F 0 3 8	3.8 V
R1515S039B	F 0 3 9	3.9 V
R1515S040B	F 0 4 0	4.0 V
R1515S041B	F 0 4 1	4.1 V
R1515S042B	F 0 4 2	4.2 V
R1515S043B	F 0 4 3	4.3 V
R1515S044B	F 0 4 4	4.4 V
R1515S045B	F 0 4 5	4.5 V
R1515S046B	F 0 4 6	4.6 V
R1515S047B	F 0 4 7	4.7 V
R1515S048B	F 0 4 8	4.8 V
R1515S049B	F 0 4 9	4.9 V
R1515S050B	F 0 5 0	5.0 V
R1515S051B	F 0 5 1	5.1 V
R1515S052B	F 0 5 2	5.2 V
R1515S053B	F 0 5 3	5.3 V
R1515S054B	F 0 5 4	5.4 V
R1515S055B	F 0 5 5	5.5 V
R1515S056B	F 0 5 6	5.6 V
R1515S057B	F 0 5 7	5.7 V
R1515S058B	F 0 5 8	5.8 V
R1515S059B	F 0 5 9	5.9 V

Product Name	①②③④	V_{SET}
R1515S060B	F 0 6 0	6.0 V
R1515S061B	F 0 6 1	6.1 V
R1515S062B	F 0 6 2	6.2 V
R1515S063B	F 0 6 3	6.3 V
R1515S064B	F 0 6 4	6.4 V
R1515S065B	F 0 6 5	6.5 V
R1515S066B	F 0 6 6	6.6 V
R1515S067B	F 0 6 7	6.7 V
R1515S068B	F 0 6 8	6.8 V
R1515S069B	F 0 6 9	6.9 V
R1515S070B	F 0 7 0	7.0 V
R1515S071B	F 0 7 1	7.1 V
R1515S072B	F 0 7 2	7.2 V
R1515S073B	F 0 7 3	7.3 V
R1515S074B	F 0 7 4	7.4 V
R1515S075B	F 0 7 5	7.5 V
R1515S076B	F 0 7 6	7.6 V
R1515S077B	F 0 7 7	7.7 V
R1515S078B	F 0 7 8	7.8 V
R1515S079B	F 0 7 9	7.9 V
R1515S080B	F 0 8 0	8.0 V
R1515S081B	F 0 8 1	8.1 V
R1515S082B	F 0 8 2	8.2 V
R1515S083B	F 0 8 3	8.3 V
R1515S084B	F 0 8 4	8.4 V
R1515S085B	F 0 8 5	8.5 V
R1515S086B	F 0 8 6	8.6 V
R1515S087B	F 0 8 7	8.7 V
R1515S088B	F 0 8 8	8.8 V
R1515S089B	F 0 8 9	8.9 V
R1515S090B	F 0 9 0	9.0 V
R1515S091B	F 0 9 1	9.1 V
R1515S092B	F 0 9 2	9.2 V
R1515S093B	F 0 9 3	9.3 V
R1515S094B	F 0 9 4	9.4 V
R1515S095B	F 0 9 5	9.5 V
R1515S096B	F 0 9 6	9.6 V
R1515S097B	F 0 9 7	9.7 V
R1515S098B	F 0 9 8	9.8 V
R1515S099B	F 0 9 9	9.9 V

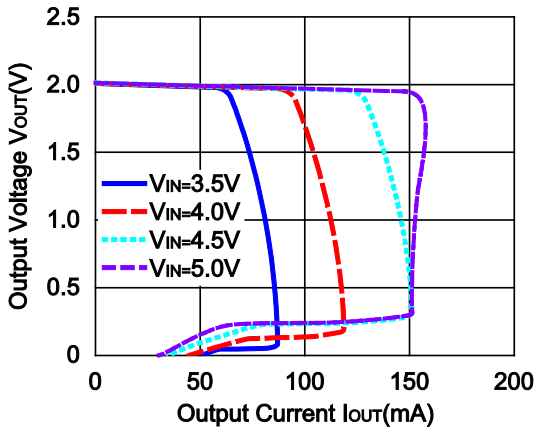
Product Name	①②③④	V_{SET}
R1515S100B	F 1 0 0	10.0 V
R1515S101B	F 1 0 1	10.1 V
R1515S102B	F 1 0 2	10.2 V
R1515S103B	F 1 0 3	10.3 V
R1515S104B	F 1 0 4	10.4 V
R1515S105B	F 1 0 5	10.5 V
R1515S106B	F 1 0 6	10.6 V
R1515S107B	F 1 0 7	10.7 V
R1515S108B	F 1 0 8	10.8 V
R1515S109B	F 1 0 9	10.9 V
R1515S110B	F 1 1 0	11.0 V
R1515S111B	F 1 1 1	11.1 V
R1515S112B	F 1 1 2	11.2 V
R1515S113B	F 1 1 3	11.3 V
R1515S114B	F 1 1 4	11.4 V
R1515S115B	F 1 1 5	11.5 V
R1515S116B	F 1 1 6	11.6 V
R1515S117B	F 1 1 7	11.7 V
R1515S118B	F 1 1 8	11.8 V
R1515S119B	F 1 1 9	11.9 V
R1515S120B	F 1 2 0	12.0 V

TYPICAL CHARACTERISTICS

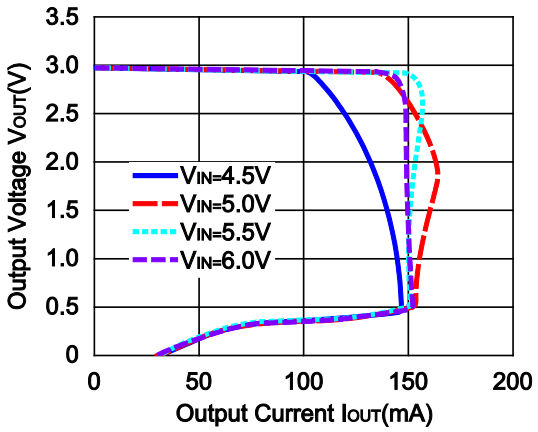
Note: Typical Characteristics are intended to be used as reference data; they are not guaranteed.

1) Output Voltage vs. Output Current (Ta=25°C)

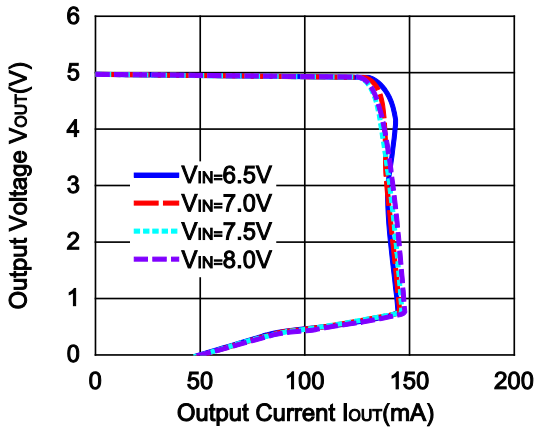
R1515x020B



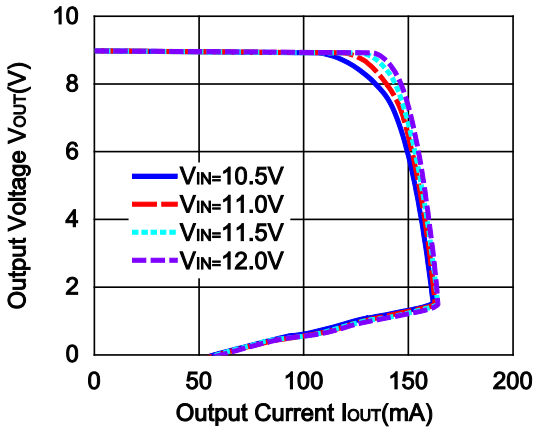
R1515x030B



R1515x050B

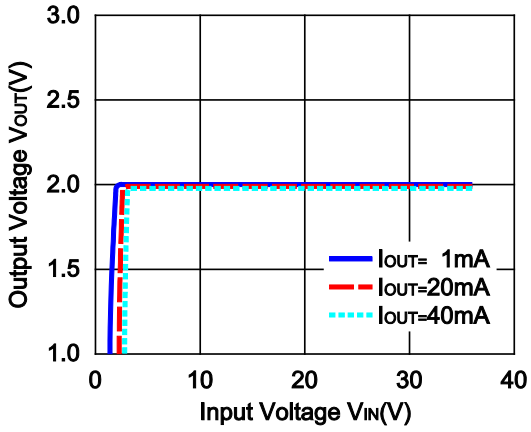


R1515x090B

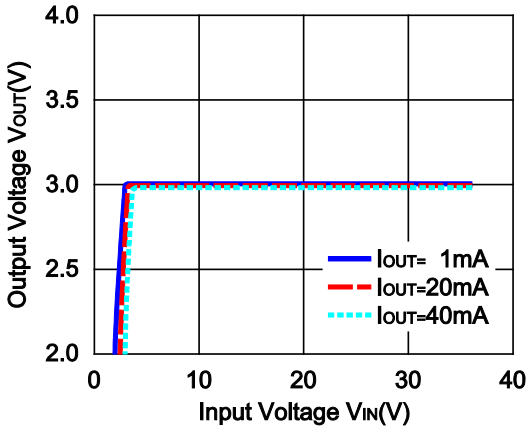


2) Output Voltage vs. Input Voltage (Ta=25°C)

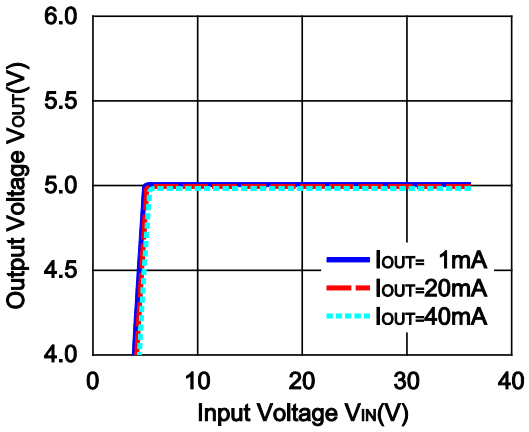
R1515x020B



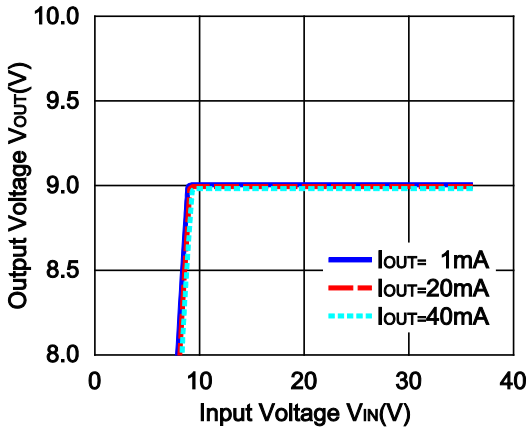
R1515x030B



R1515x050B

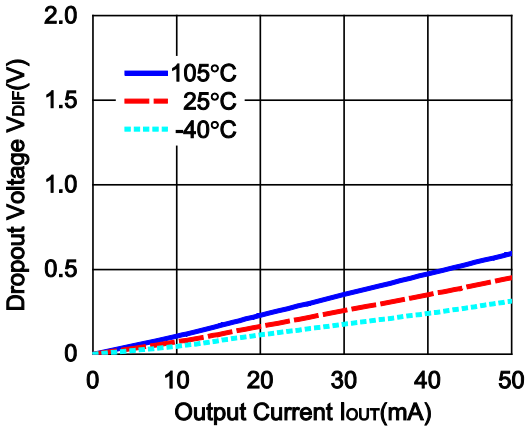


R1515x090B

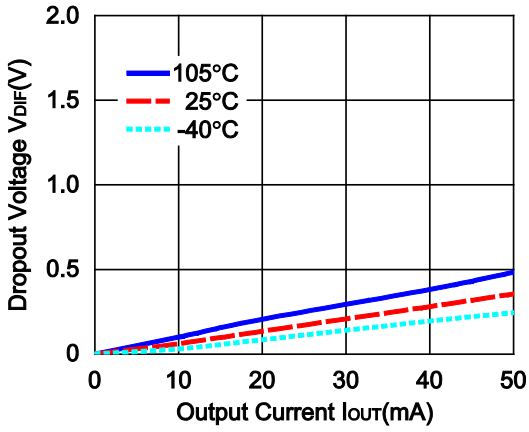


3) Dropout Voltage vs. Output Current

R1515x050B

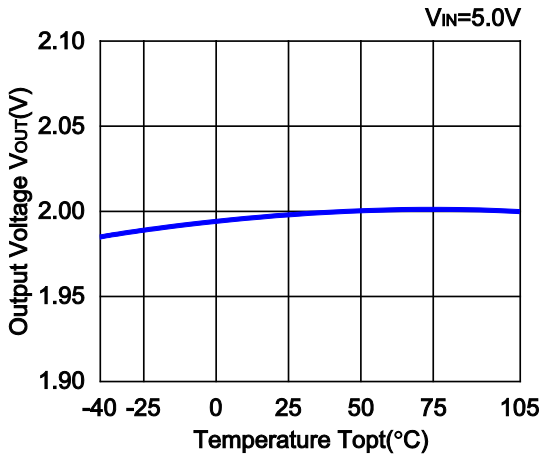


R1515x090B

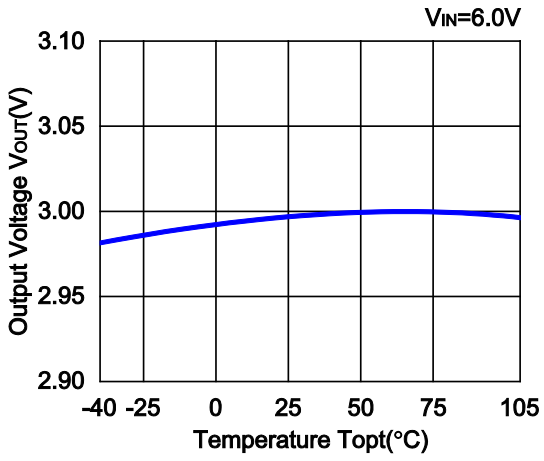


4) Output Voltage vs. Temperature

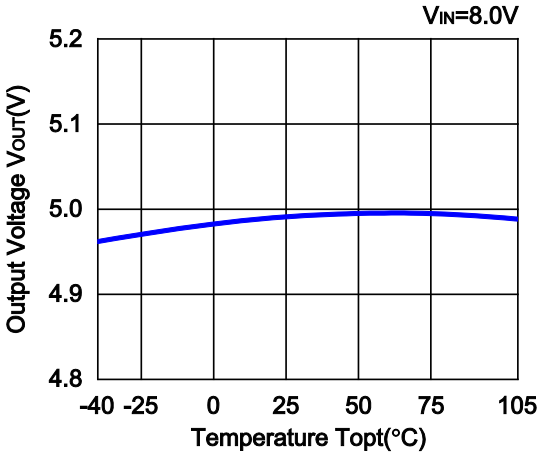
R1515x020B



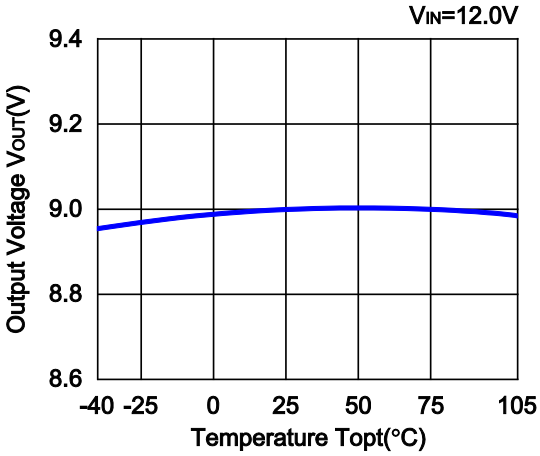
R1515x030B



R1515x050B

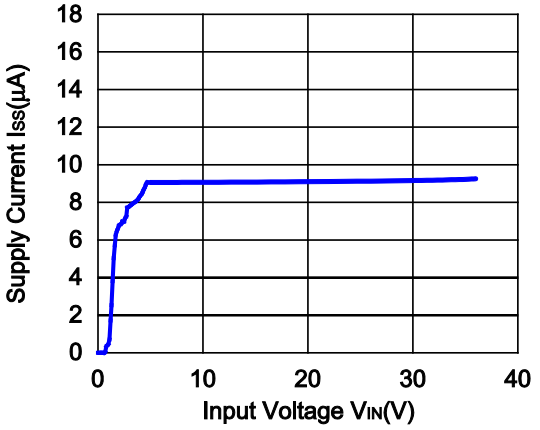


R1515x090B

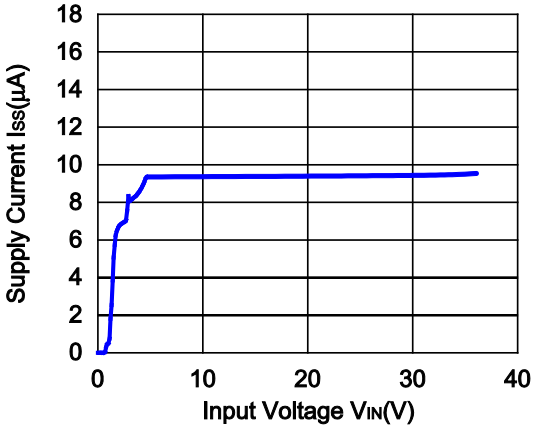


5) Supply Current vs. Input Voltage (Ta=25°C)

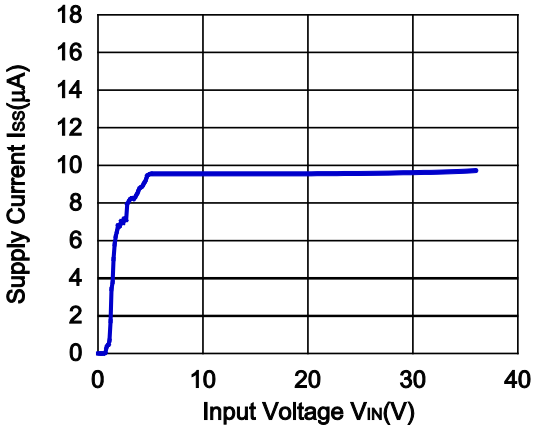
R1515x020B



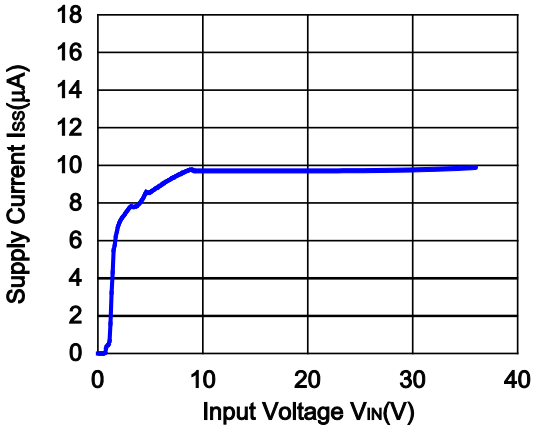
R1515x030B



R1515x050B

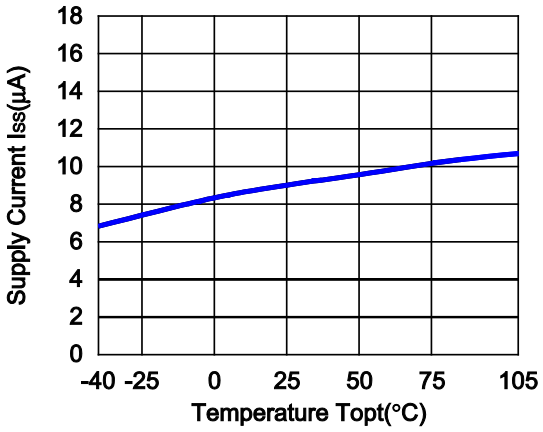


R1515x090B

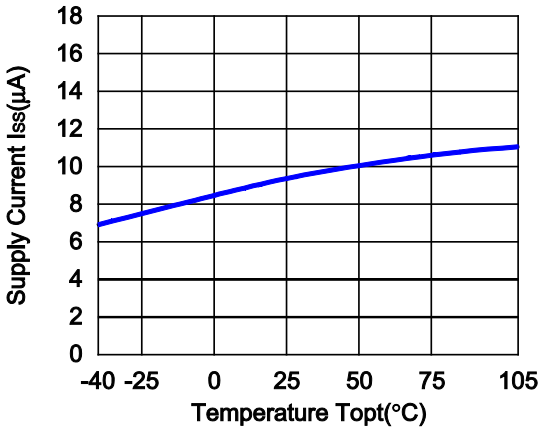


6) Supply Current vs. Temperature

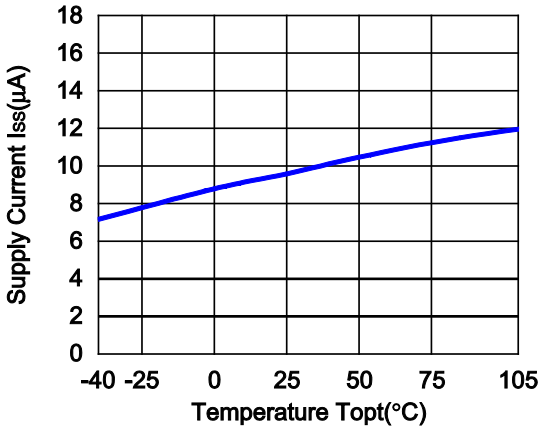
R1515x020B



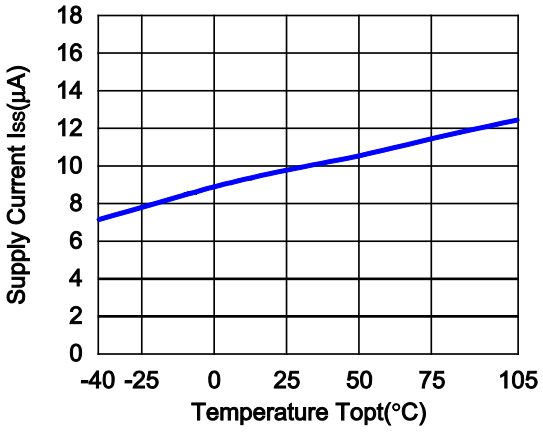
R1515x030B



R1515x050B

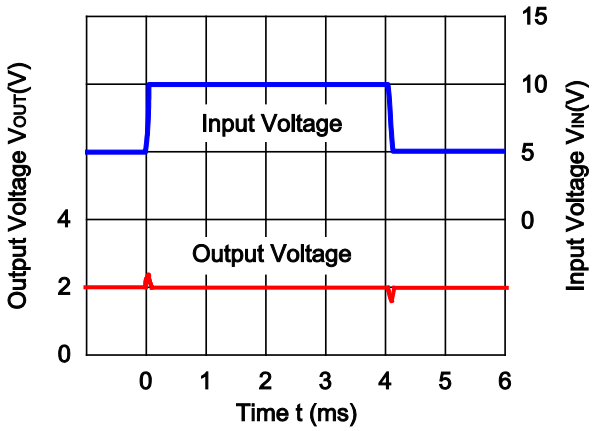


R1515x090B

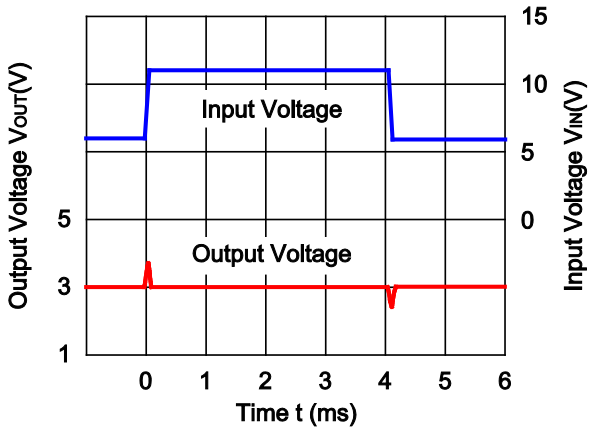


7) Input Transient Response (I_{OUT}=1mA, tr=tf=50µs, C2=Ceramic 0.1µF, Ta=25°C)

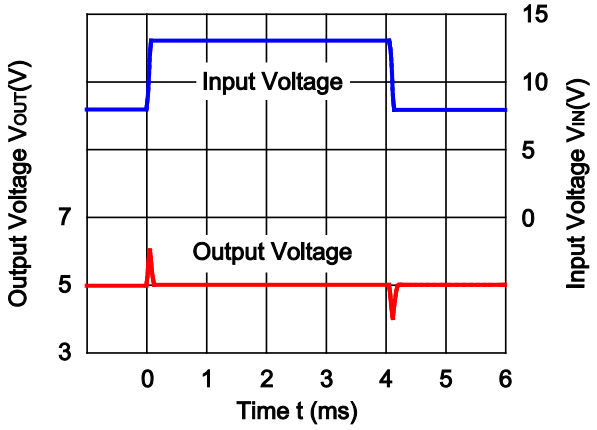
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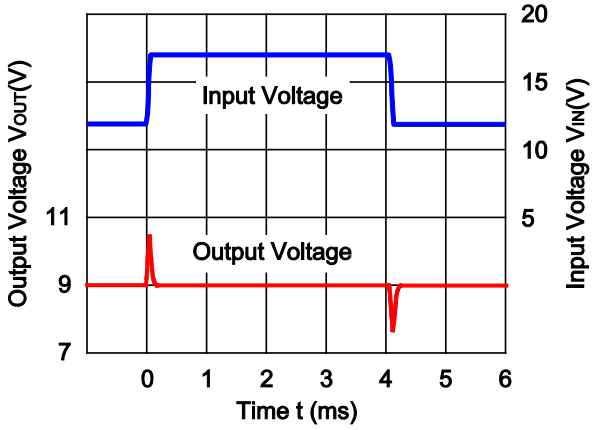
R1515x030B



R1515x050B

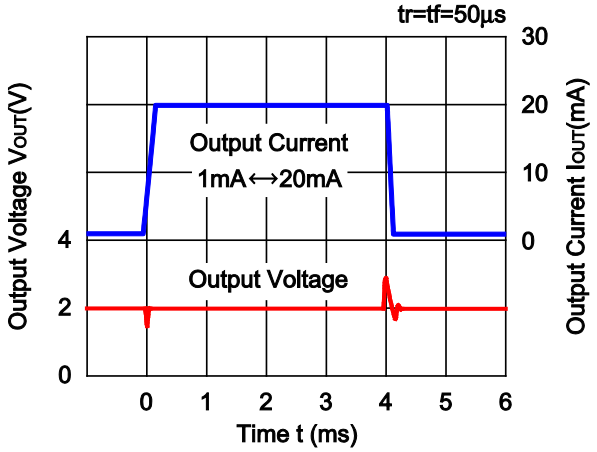


R1515x090B

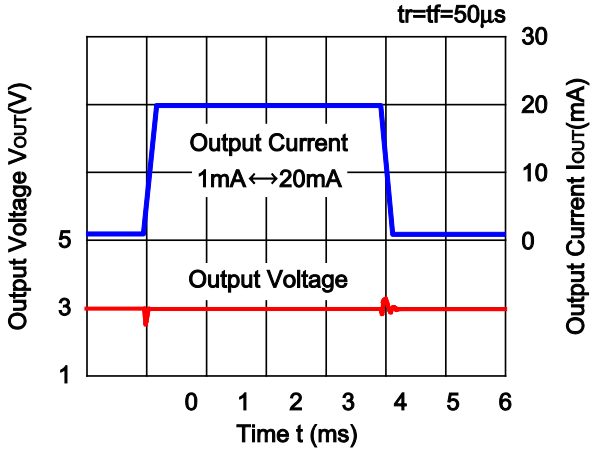


8) Load Transient Response (C2=Ceramic 0.1µF, Ta=25°C)

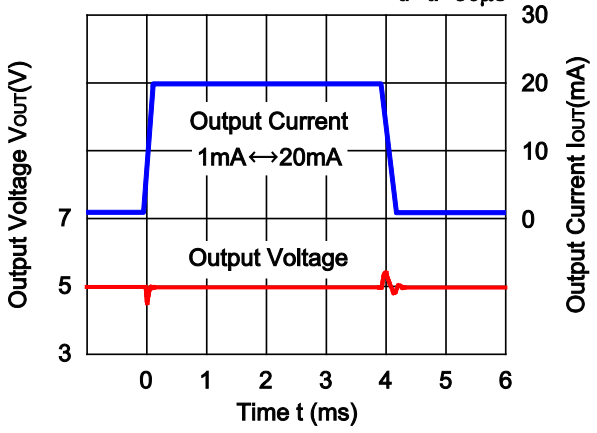
R1515x020B VIN=5.0V tr=tf=50µs



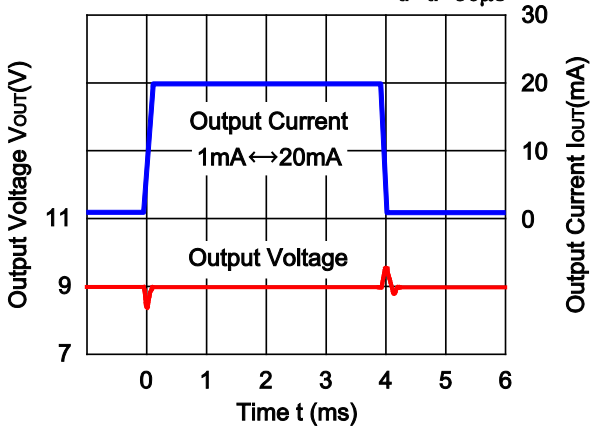
R1515x030B VIN=6.0V tr=tf=50µs



R1515x050B VIN=8.0V tr=tf=50µs



R1515x090B VIN=12.0V tr=tf=50µs



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    In the case of a product purchased through an authorized distributor or directly from us, the warranty period for this product shall be one (1) year after delivery to your company. For defective products that occurred during this period, we will take the quality warranty measures described in section 8-2. However, if there is an agreement on the warranty period in the basic transaction agreement, quality assurance agreement, delivery specifications, etc., it shall be followed.

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    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

    With respect to any defect of this product found after the quality warranty period, the defect will be analyzed by us. On the basis of the defect analysis results, the scope and amounts of damage shall be determined by mutual agreement of both parties. Then we will deal with upper limit in Section 8-2. This provision is not intended to limit any legal rights of your company.
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13. Please contact our sales representatives should you have any questions or comments concerning the products or the technical information.

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