RQ3E180AJ

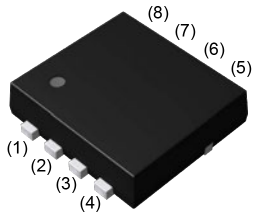
Nch 30V 18A Middle Power MOSFET

Datasheet

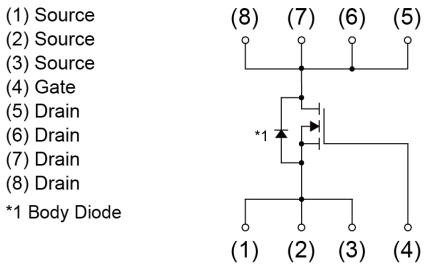
V_{DSS}	30V
$R_{DS(on)}$(Max.)	4.5mΩ
I_D	±30A
P_D	2W

●Outline

HSMT8



●Inner circuit



●Features

1) Low on - resistance.
2) Small Surface Mount Package.
3) Pb-free lead plating ; RoHS compliant

●Application

Switching

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	3000
	Taping code	TB
	Marking	E180AJ

●Absolute maximum ratings (T_a = 25°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	30	V
Continuous drain current	T_c = 25°C	I_D*4	±30	A
	T_a = 25°C	I_D	±18	A
Pulsed drain current		$I_{D,pulse}$*1	±72	A
Gate - Source voltage		V_{GSS}	±12	V
Avalanche energy, single pulse		E_{AS}*2	24.6	mJ
Avalanche current		I_{AS}*2	18	A
Power dissipation		P_D*3	2	W
		P_D*4	30	W
Junction temperature		T_j	150	℃
Range of storage temperature		T_{stg}	-55 to +150	℃

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●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *3	-	62.5	-	℃/W
Thermal resistance, junction - case	R_{thJC} *4	-	4.17	-	℃/W

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	18	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±12V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 11mA	0.5	-	1.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	-2.0	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = 4.5V, I_D = 18A	-	3.5	4.5	mΩ
		V_{GS} = 2.5V, I_D = 18A	-	4.5	5.8	
Forward Transfer Admittance	$\|Y_{fs}\|$ *5	V_{DS} = 5V, I_D = 18A	24	-	-	S

*1 Pw ≤ 10μs, Duty cycle ≤ 1%

*2 L ≃ 100uH, V_{DD} = 15V, R_G = 25Ω, STARTING T_{ch} = 25℃ Fig.3-1,3-2

*3 Mounted on a ceramic boad (30×30×0.8mm)

*4 Tc=25℃

*5 Pulsed

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●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	4290	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	490	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	320	-	
Turn - on delay time	$t_{d(on)}$ *5	V_{DD} ≃ 15V, V_{GS} = 4.5V	-	28	-	ns
Rise time	t_r *5	I_D = 9A	-	22	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L ≃ 1.67Ω	-	150	-	
Fall time	t_f *5	R_G = 10Ω	-	160	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *5	V_{DD} ≃ 15V, I_D = 18A, V_{GS} = 4.5V	-	39	-	nC
Gate - Source charge	Q_{gs} *5		-	10	-	
Gate - Drain charge	Q_{gd} *5		-	10	-	

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S *1	T_a = 25°C	-	-	1.67	A
Body diode pulse current	I_{SP} *2		-	-	72	A
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = 1.67A	-	-	1.2	V

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

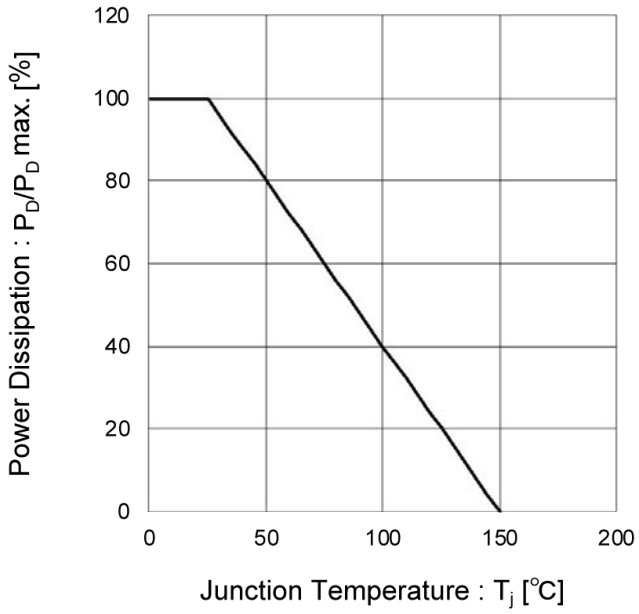


Fig.2 Maximum Safe Operating Area

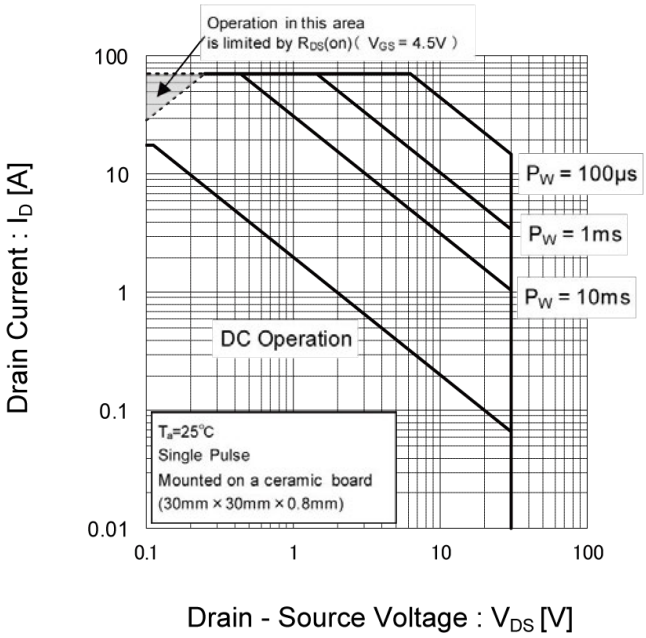


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

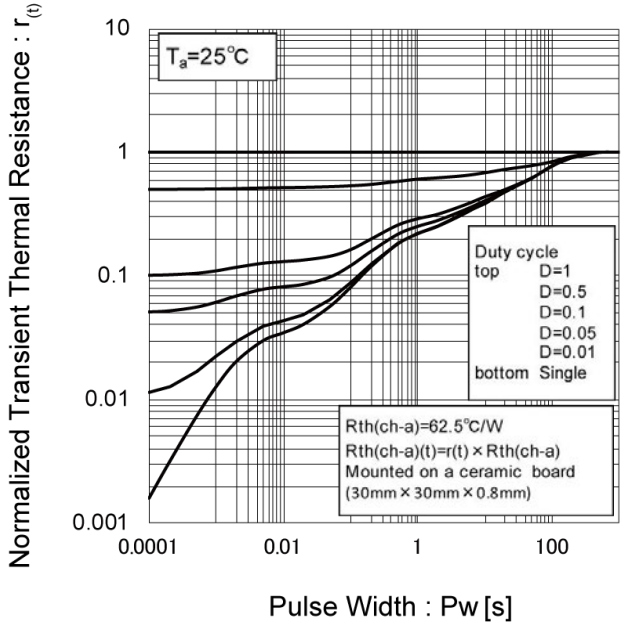
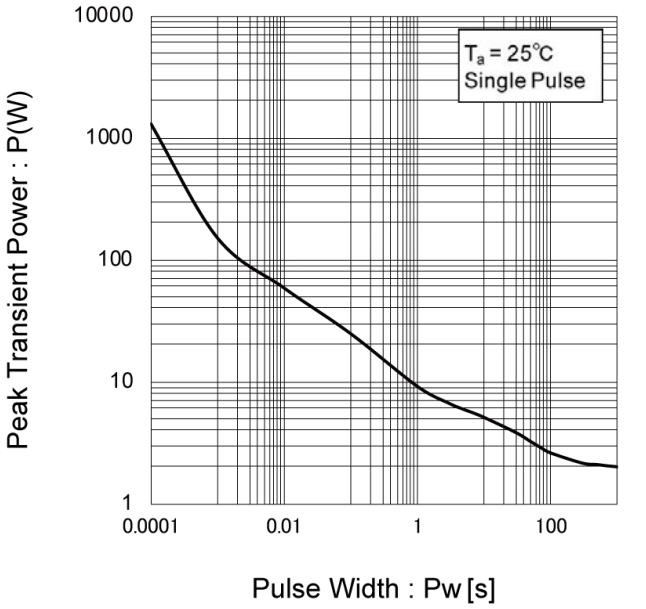


Fig.4 Single Pulse Maximum Power dissipation



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●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

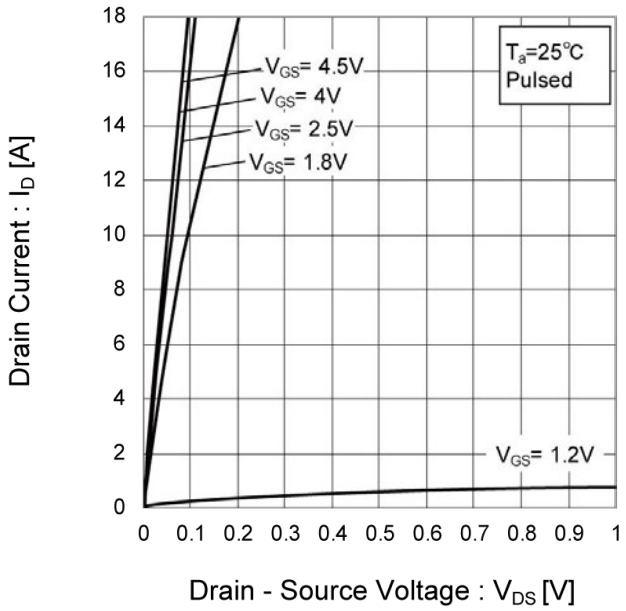


Fig.6 Typical Output Characteristics(II)

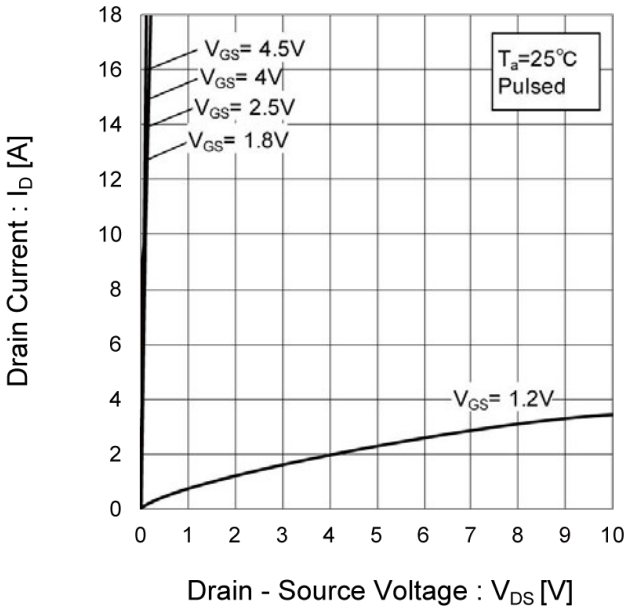
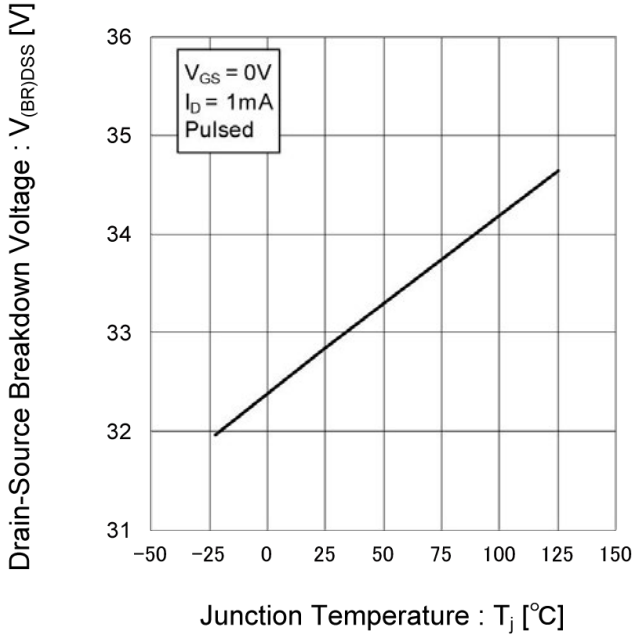


Fig.7 Breakdown Voltage vs. Junction Temperature



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●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

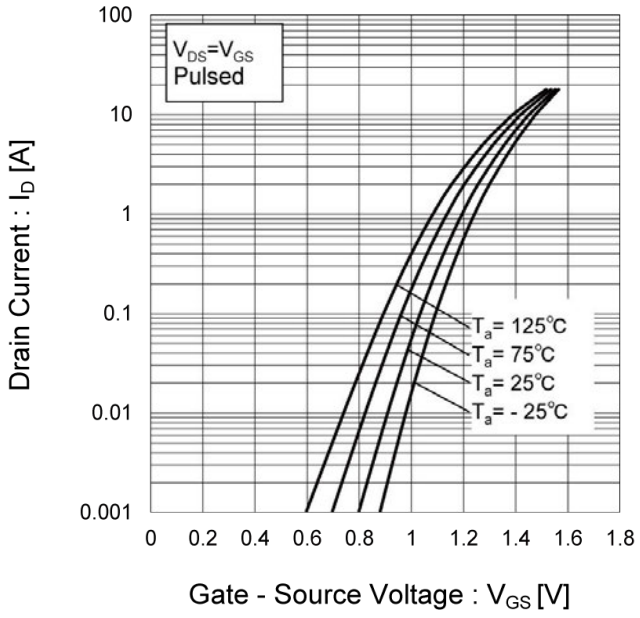


Fig.9 Gate Threshold Voltage vs. Junction Temperature

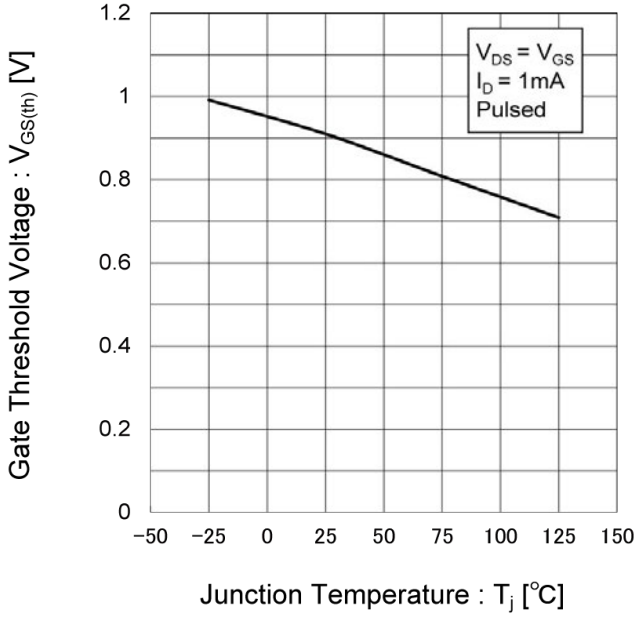
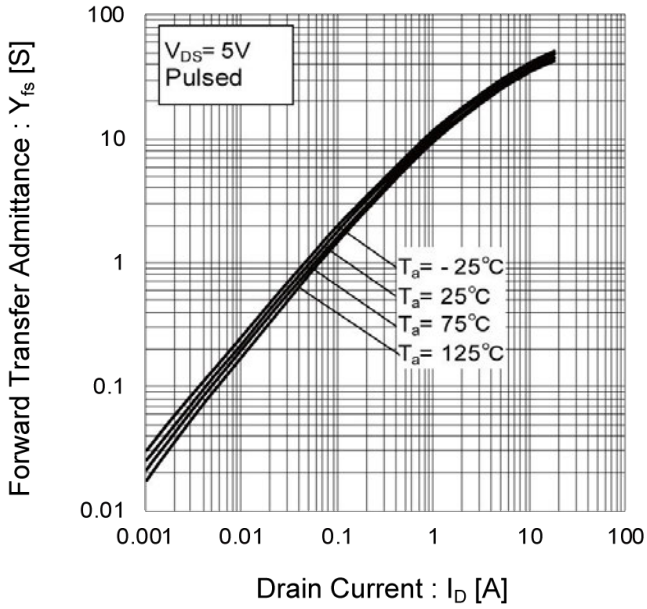


Fig.10 Transconductance vs. Drain Current



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●Electrical characteristic curves

Fig.11 Drain Current Derating Curve

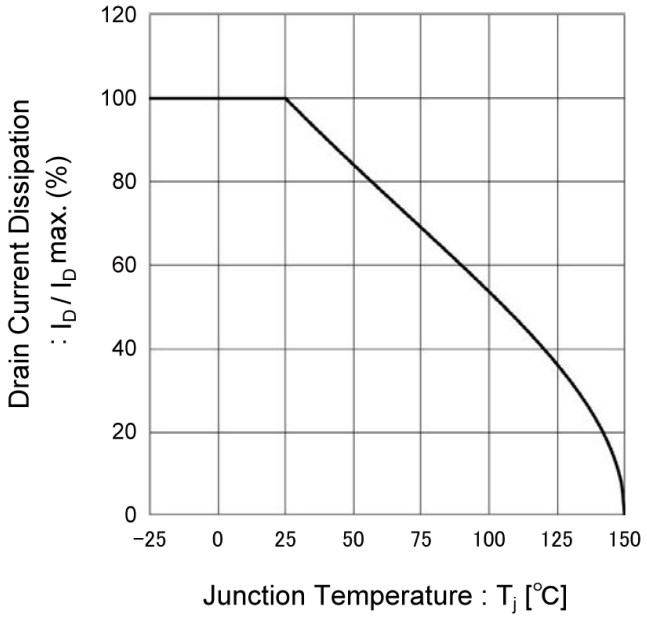


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

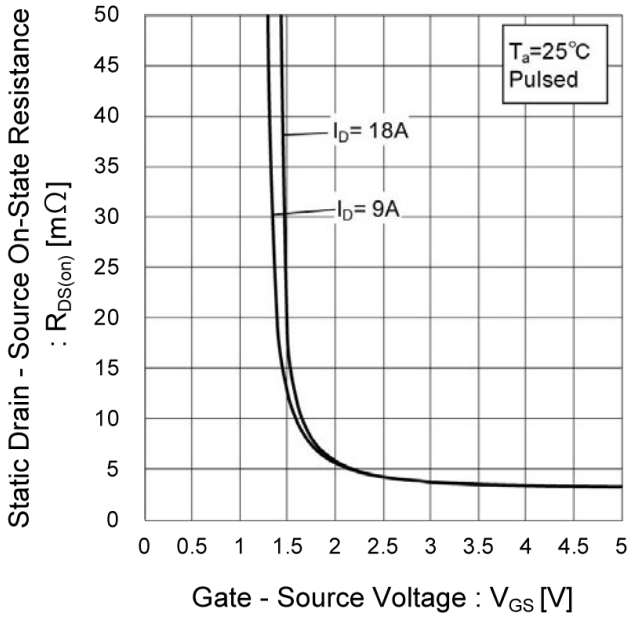
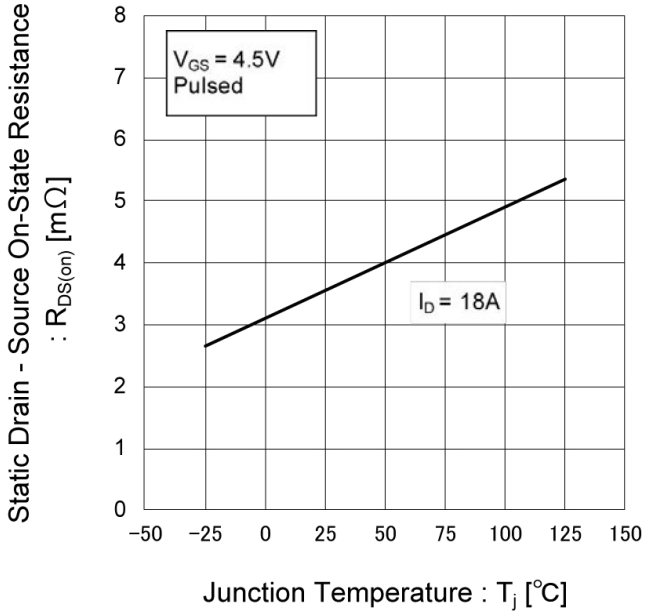


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



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●Electrical characteristic curves

Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

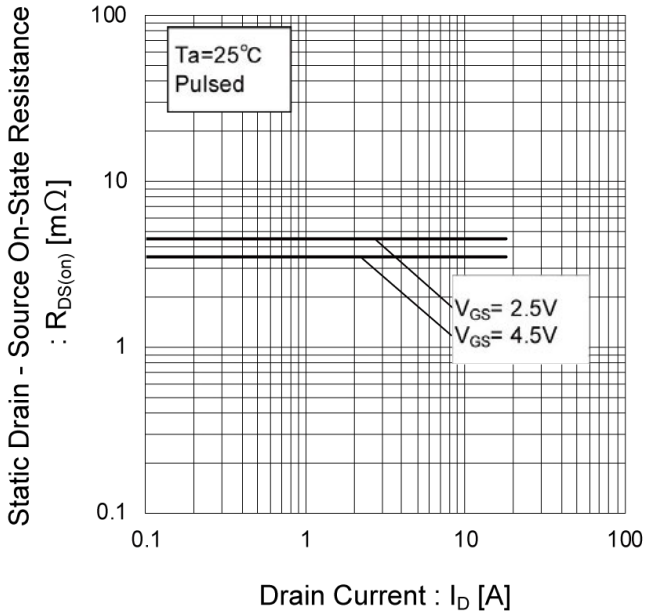


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

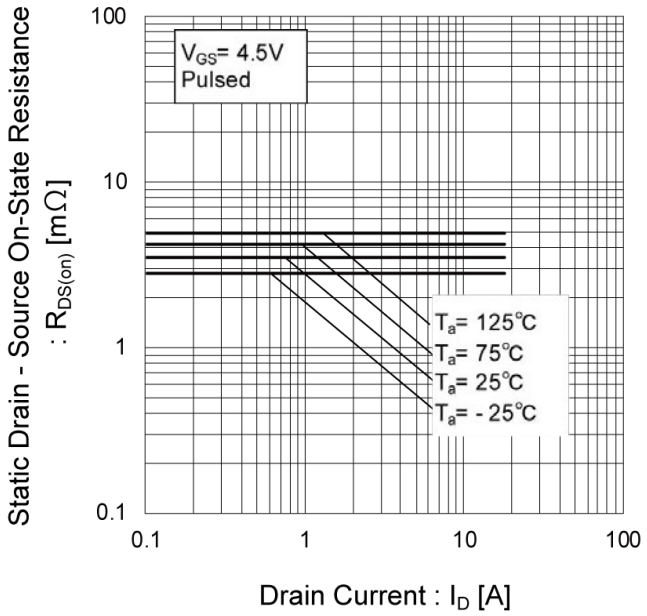
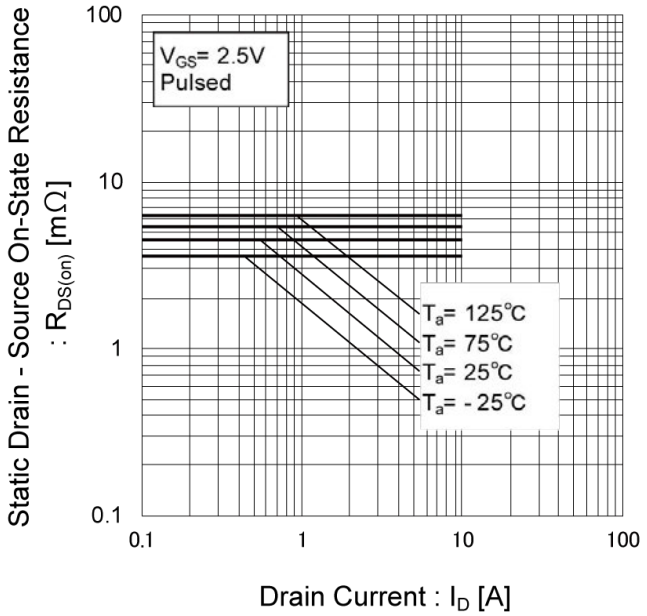


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



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●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

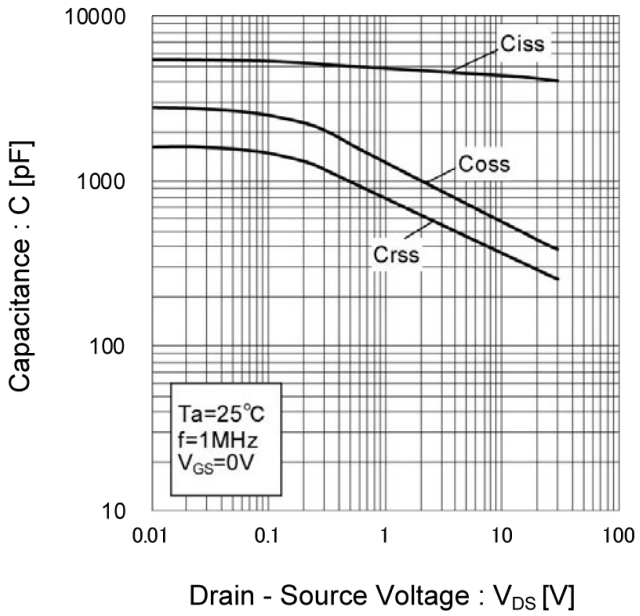


Fig.18 Switching Characteristics

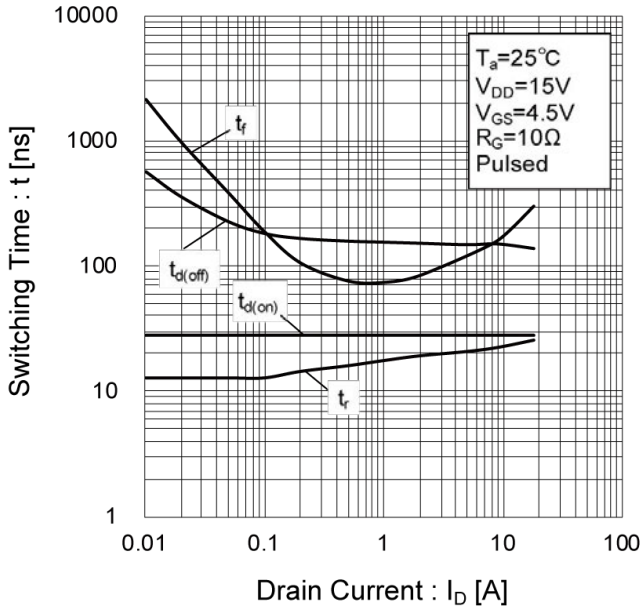


Fig.19 Dynamic Input Characteristics

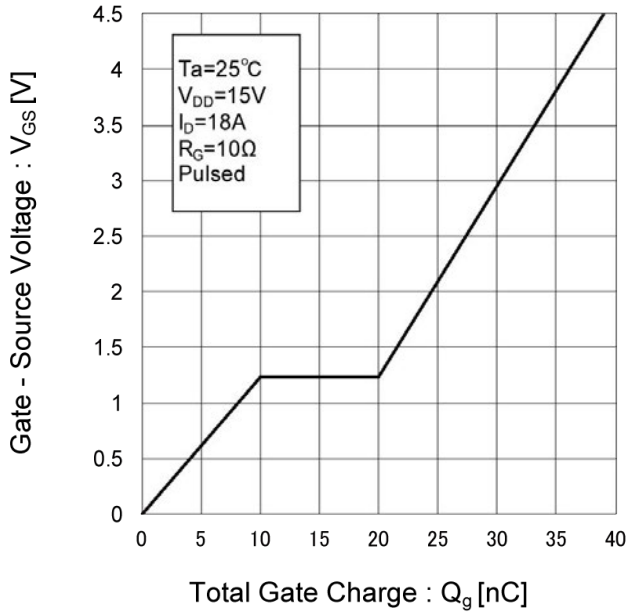
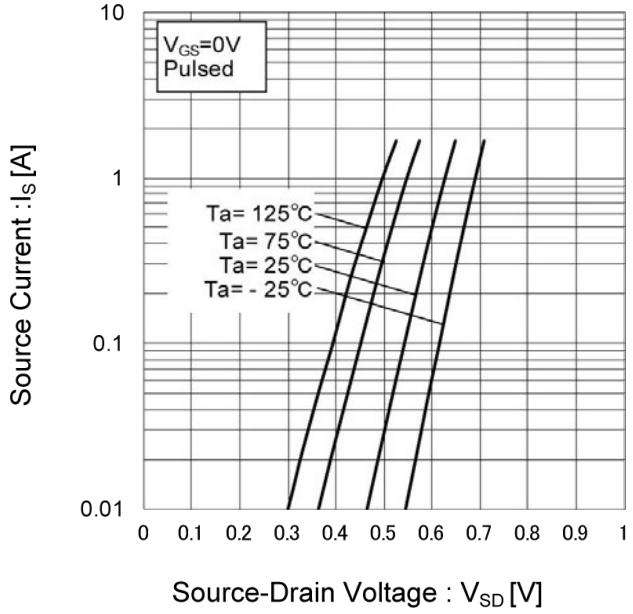


Fig.20 Source Current vs. Source Drain Voltage



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●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

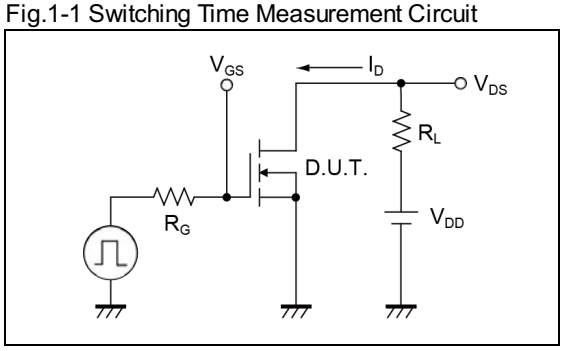


Fig.1-2 Switching Waveforms

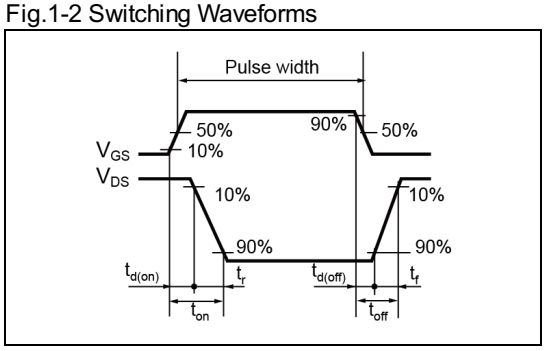


Fig.2-1 Gate Charge Measurement Circuit

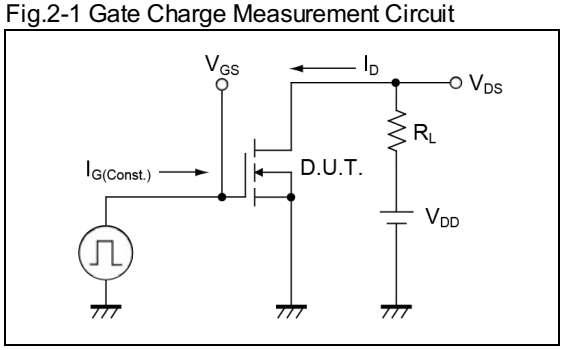


Fig.2-2 Gate Charge Waveform

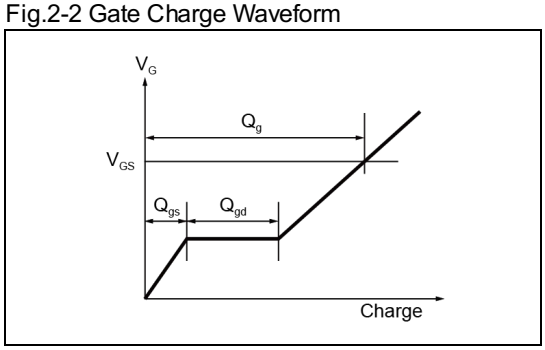


Fig.3-1 AVALANCHE MEASUREMENT CIRCUIT

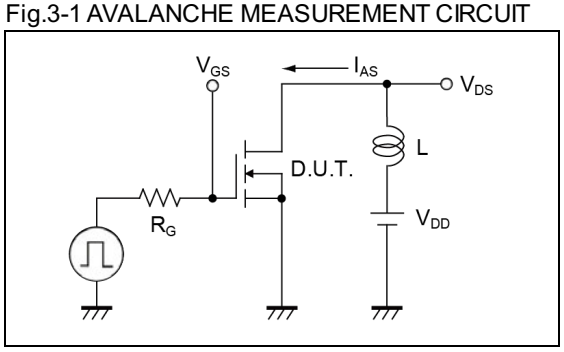
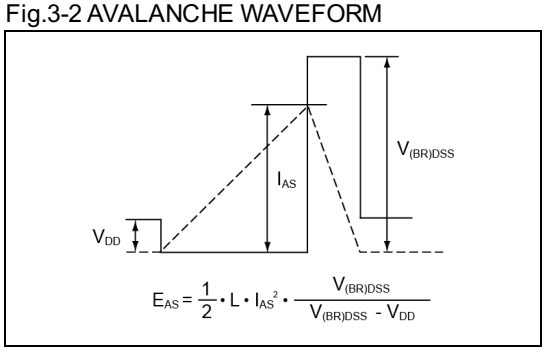


Fig.3-2 AVALANCHE WAVEFORM



●Notice

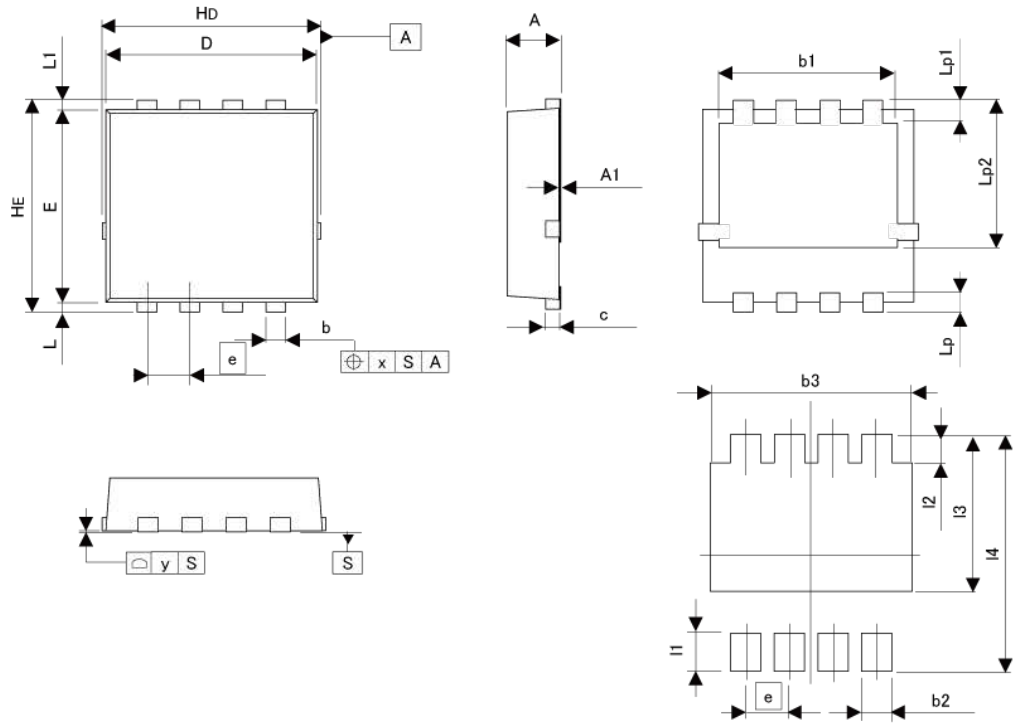
This product might cause chip aging and breakdown under the large electrified environment.
Please consider to design ESD protection circuit.

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●Dimensions

HSMT8

(3.3x3.3)



Pattern of terminal position areas
[Not a pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
A1	0.00	0.05	0.000	0.002
b	0.27	0.37	0.011	0.015
b1	2.50	2.70	0.098	0.106
c	0.10	0.30	0.004	0.012
D	3.10	3.30	0.122	0.130
E	2.90	3.10	0.114	0.122
e	0.65		0.026	
HD	3.20	3.40	0.126	0.134
HE	3.20	3.40	0.126	0.134
L	0.07	0.25	0.003	0.010
L1	0.07	0.25	0.003	0.010
Lp	0.20	0.40	0.008	0.016
Lp1	0.25	0.45	0.010	0.018
Lp2	2.20	2.40	0.087	0.094
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.47	-	0.019
b3	-	2.70	-	0.106
l1	-	0.50	-	0.020
l2	-	0.55	-	0.022
l3	-	2.40	-	0.094
l4	-	3.40	-	0.134

Dimension in mm/inches

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