

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

●Features

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

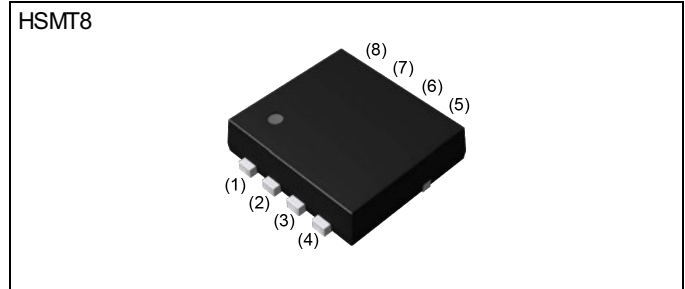
●Application

Switching

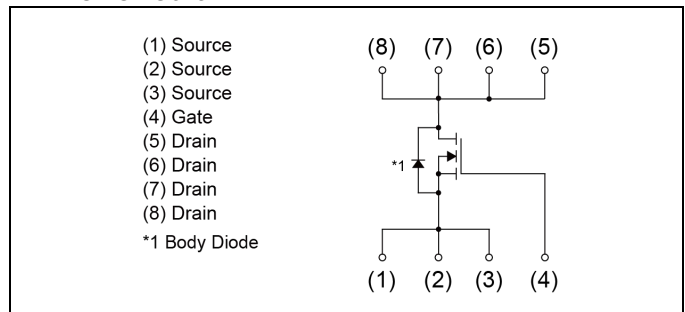
●Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit	
Drain - Source voltage	V_{DSS}	30	V	
Continuous drain current	$T_c = 25^\circ\text{C}$	I_D^{*4}	±30	A
	$T_a = 25^\circ\text{C}$	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	°C	
Range of storage temperature	T_{stg}	-55 to +150	°C	

●Outline



●Inner circuit



●Packaging specifications

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

● Thermal resistance

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

● Electrical characteristics ($T_a = 25^\circ\text{C}$)

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°C	-	18	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 24V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	± 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°C	-	-2.0	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = 4.5V, I_D = 18A$	-	3.5	4.5	m Ω
		$V_{GS} = 2.5V, I_D = 18A$	-	4.5	5.8	
Forward Transfer Admittance	$ Y_{fs} ^{*5}$	$V_{DS} = 5V, I_D = 18A$	24	-	-	S

*1 $P_w \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*2 $L \approx 100\mu\text{H}$, $V_{DD} = 15V$, $R_G = 25\Omega$, STARTING $T_{ch} = 25^\circ\text{C}$ Fig.3-1,3-2

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

*4 $T_c = 25^\circ\text{C}$

*5 Pulsed

●Electrical characteristics ($T_a = 25^\circ\text{C}$)

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}	$f = 1\text{MHz}$	-	320	-	
Turn - on delay time	$t_{d(on)}^{*5}$	$V_{DD} \approx 15V, V_{GS} = 4.5V$	-	28	-	ns
Rise time	t_r^{*5}	$I_D = 9A$	-	22	-	
Turn - off delay time	$t_{d(off)}^{*5}$	$R_L \approx 1.67\Omega$	-	150	-	
Fall time	t_f^{*5}	$R_G = 10\Omega$	-	160	-	

●Gate charge characteristics ($T_a = 25^\circ\text{C}$)

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

●Body diode electrical characteristics (Source-Drain) ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S^{*1}	$T_a = 25^\circ\text{C}$	-	-	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

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

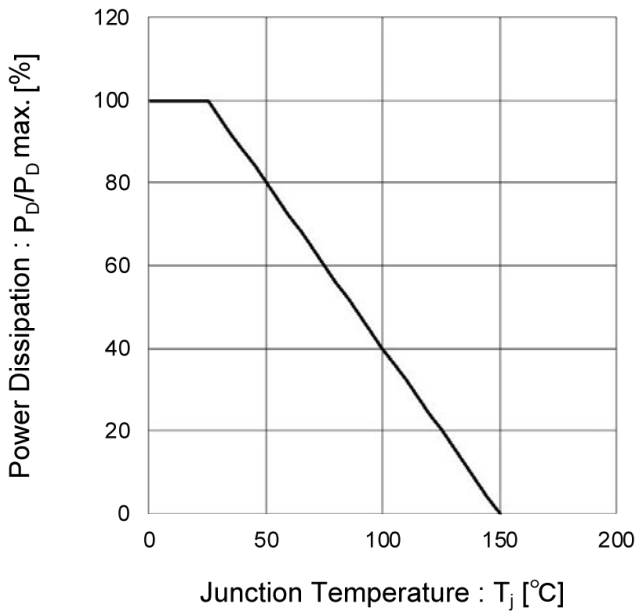


Fig.2 Maximum Safe Operating Area

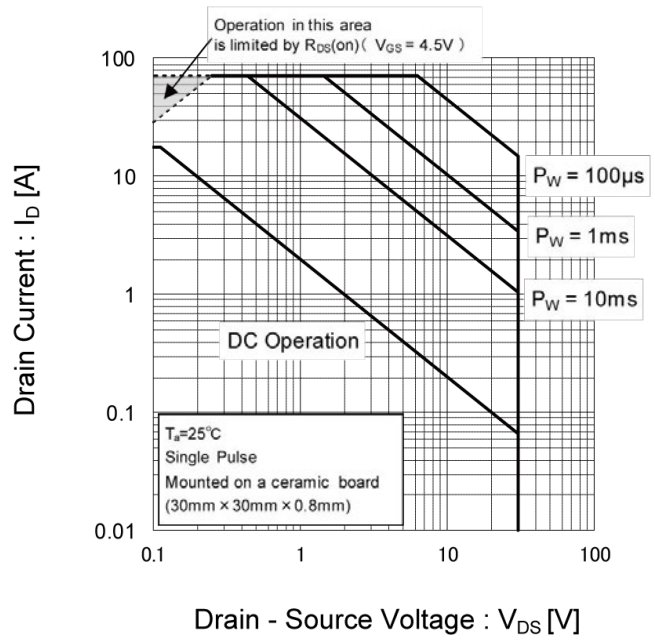


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

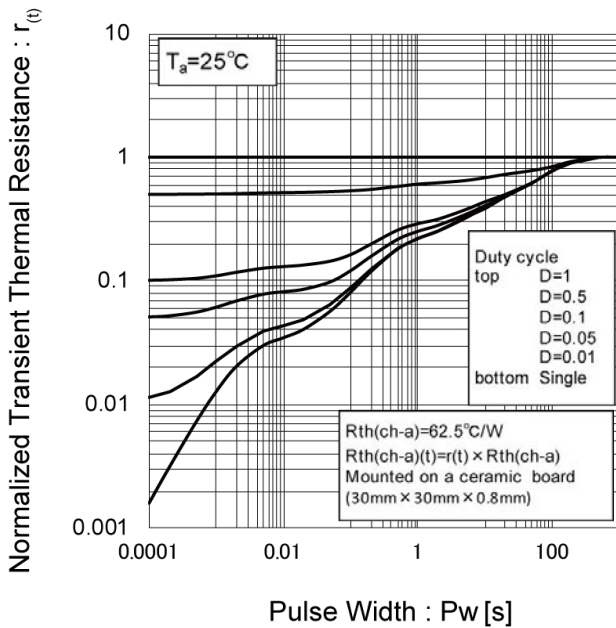
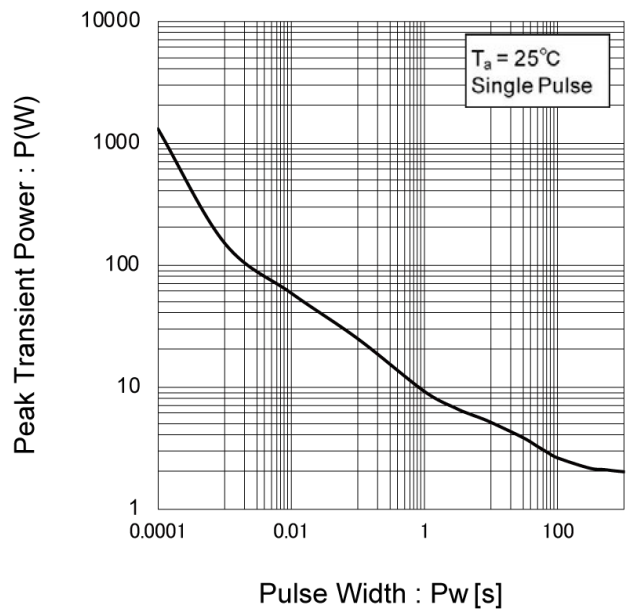


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

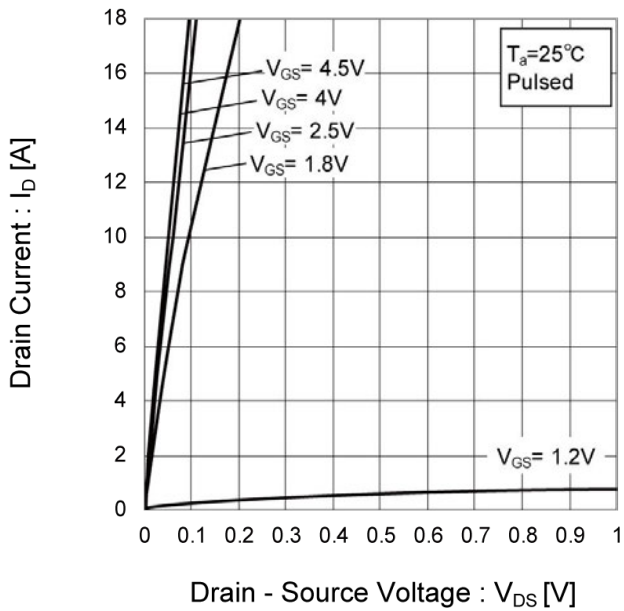


Fig.6 Typical Output Characteristics(II)

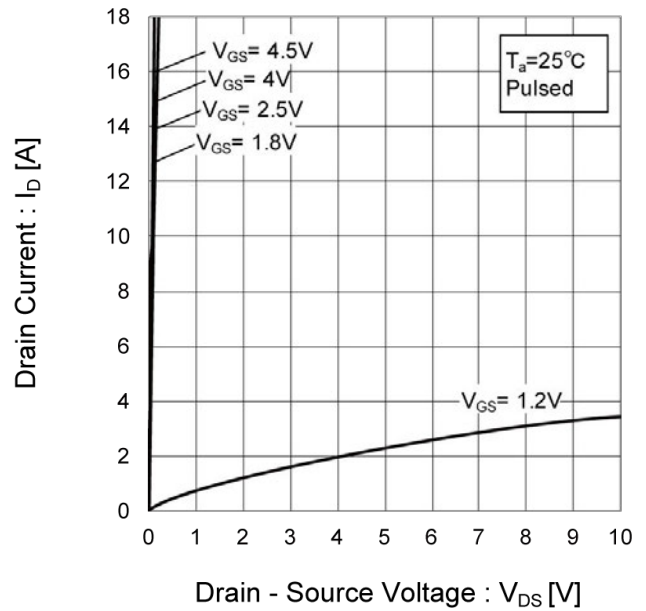
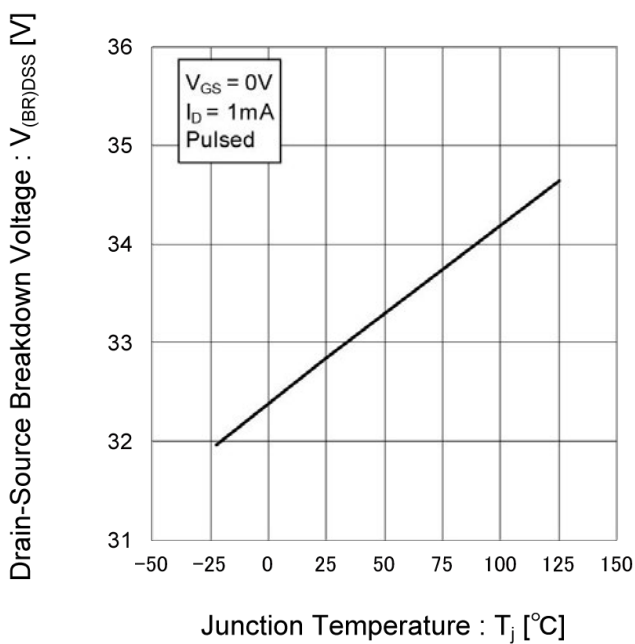


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

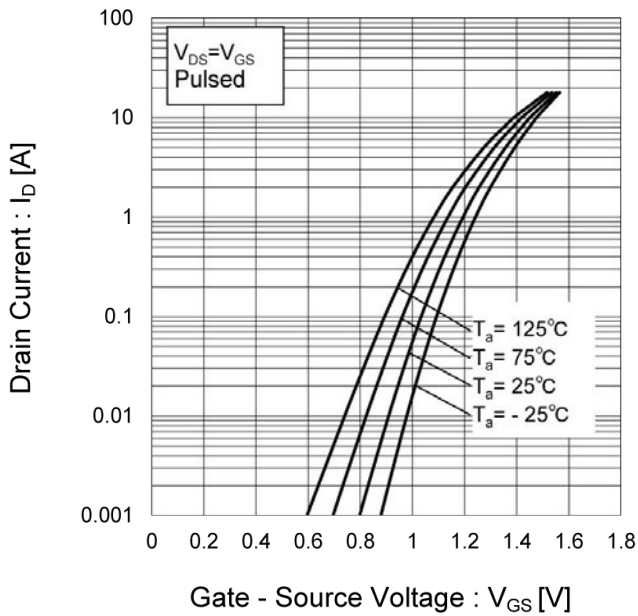


Fig.9 Gate Threshold Voltage vs. Junction Temperature

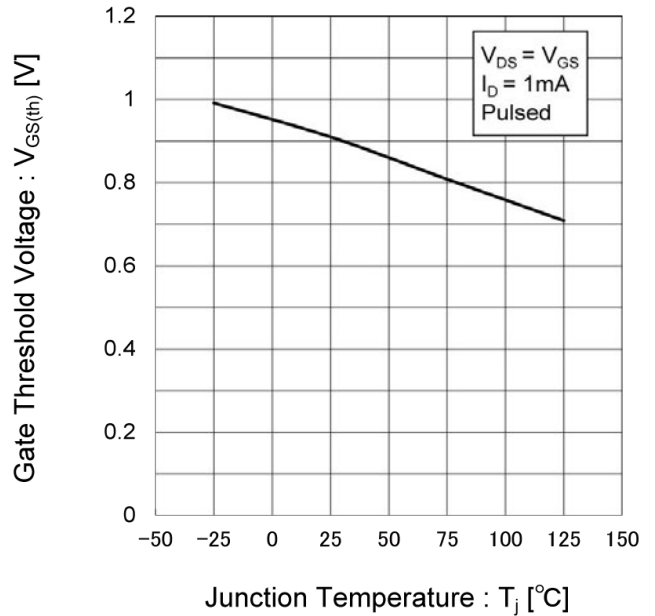
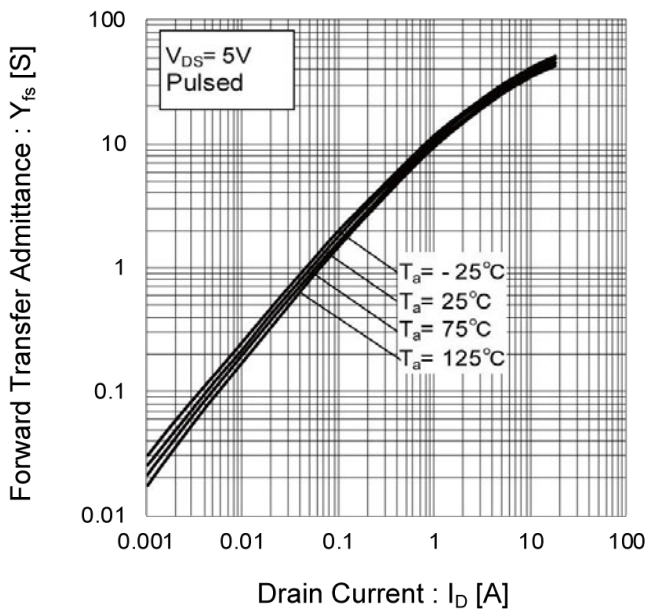


Fig.10 Transconductance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve

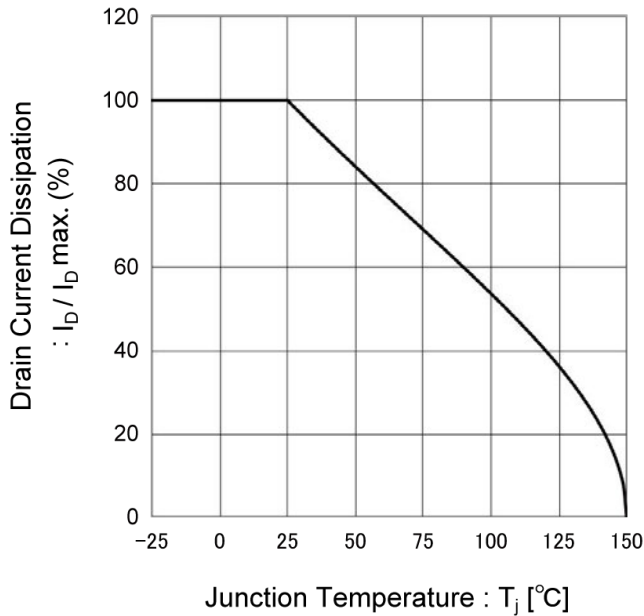


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

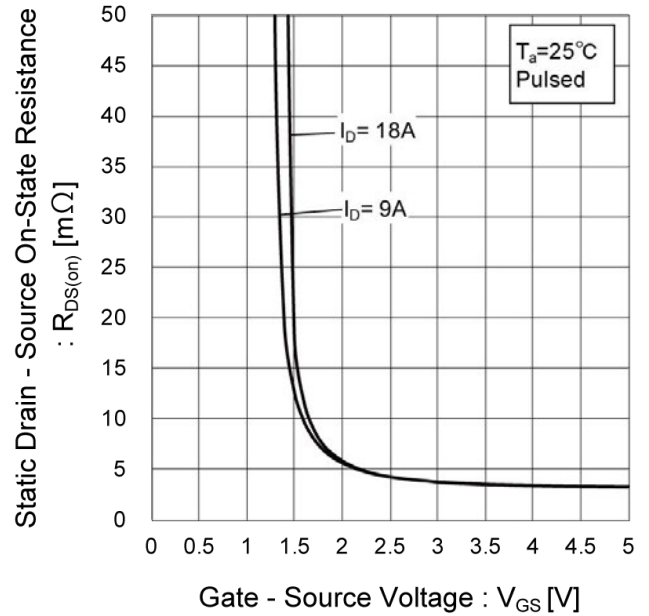
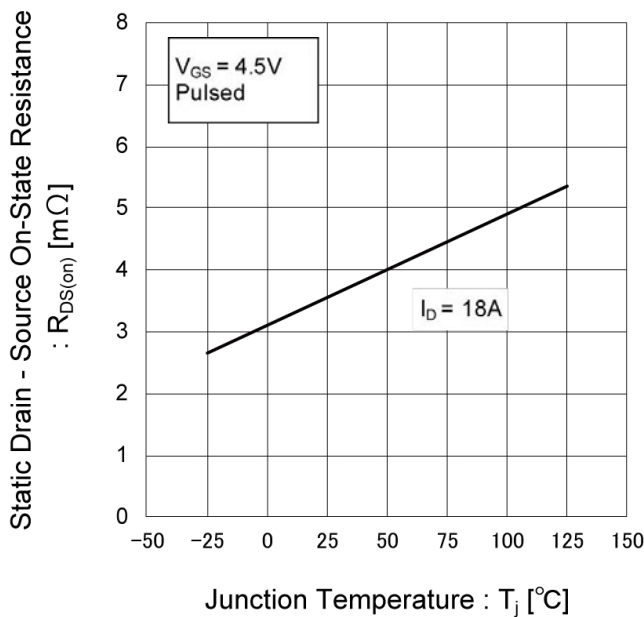


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

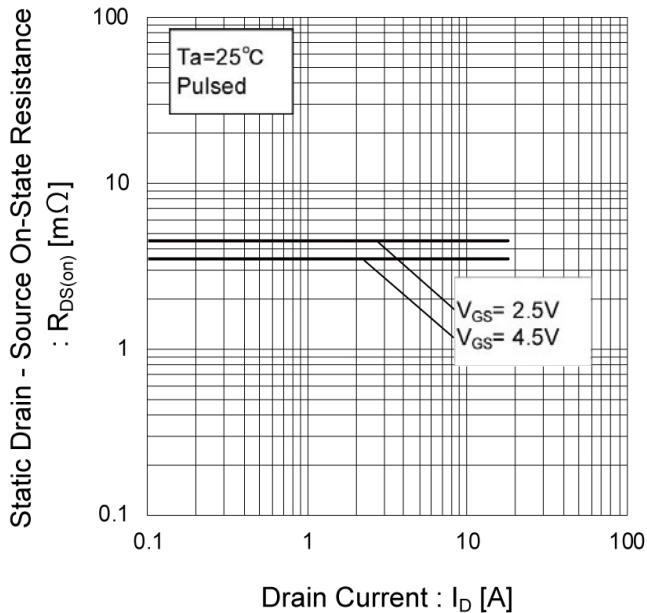


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

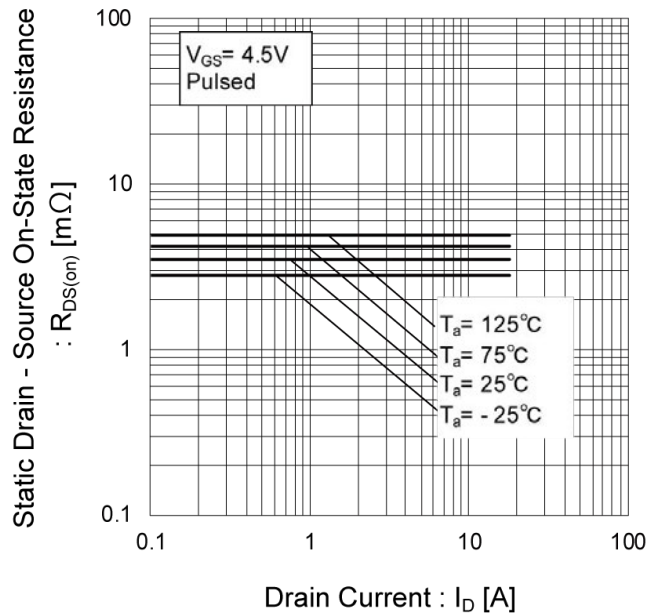
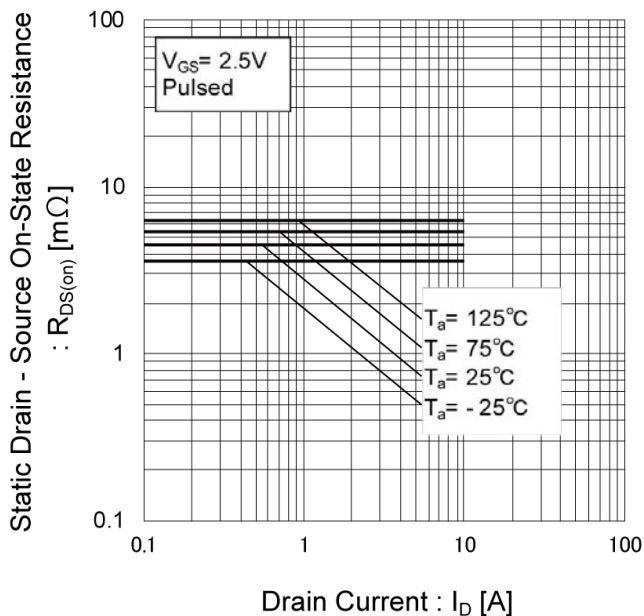


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



● Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

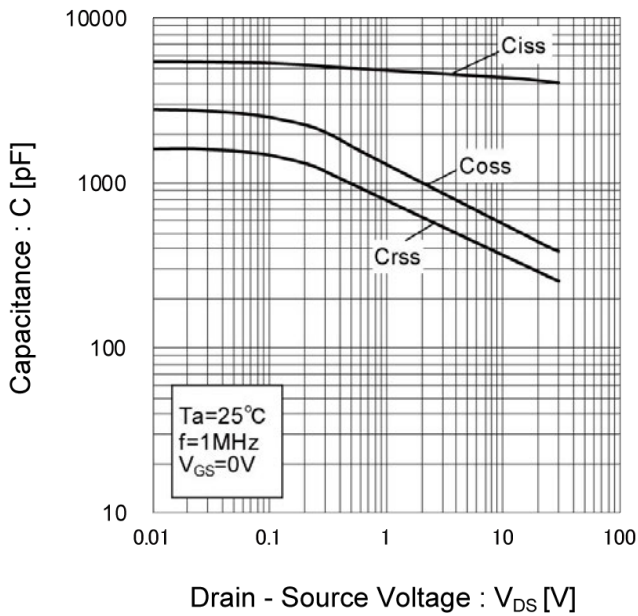


Fig.18 Switching Characteristics

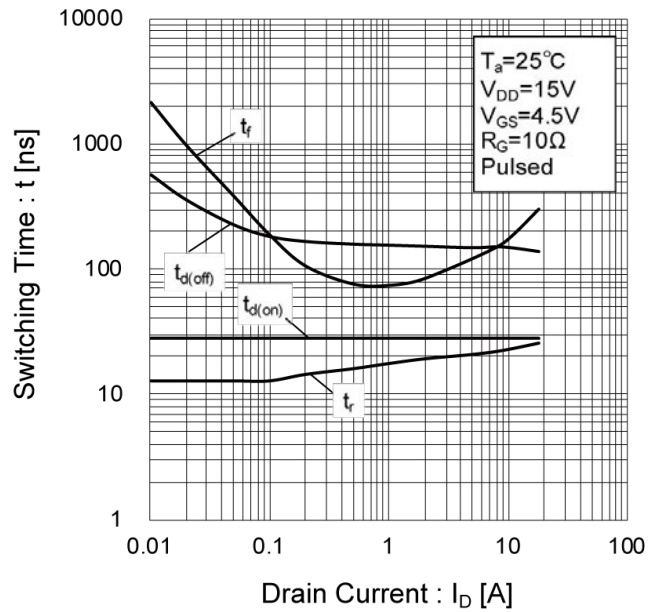


Fig.19 Dynamic Input Characteristics

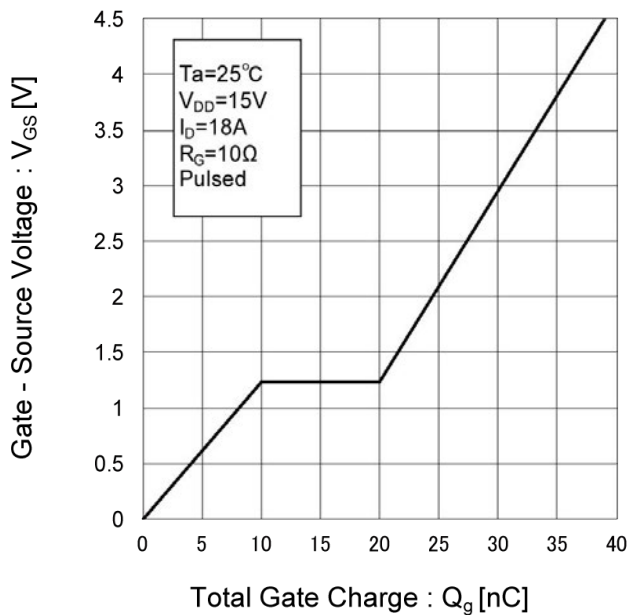
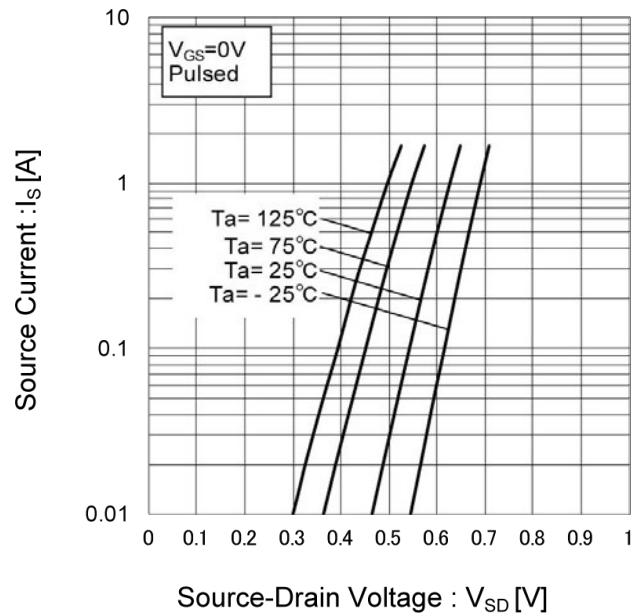


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

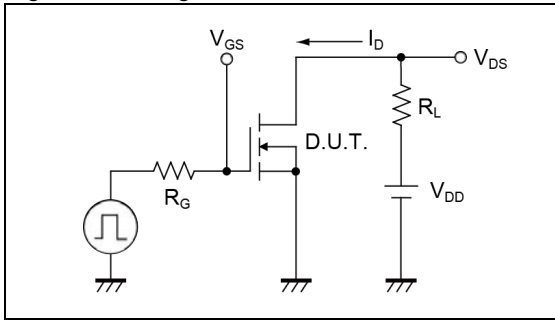


Fig.1-2 Switching Waveforms

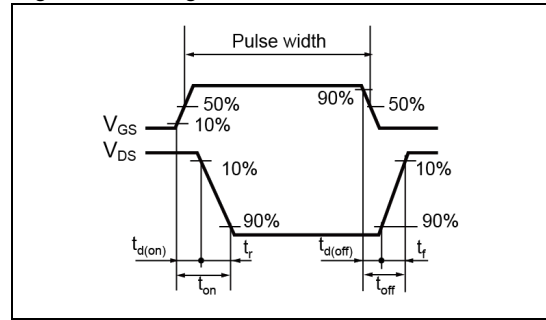


Fig.2-1 Gate Charge Measurement Circuit

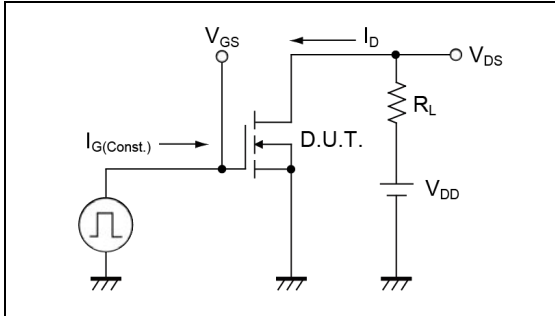


Fig.2-2 Gate Charge Waveform

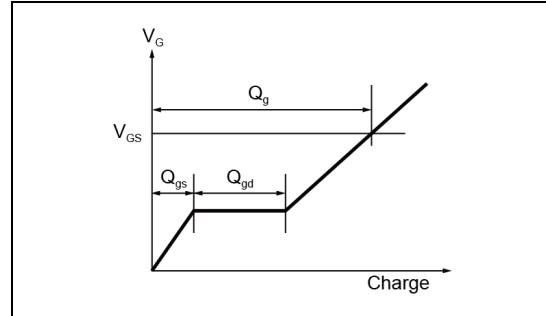


Fig.3-1 AVALANCHE MEASUREMENT CIRCUIT

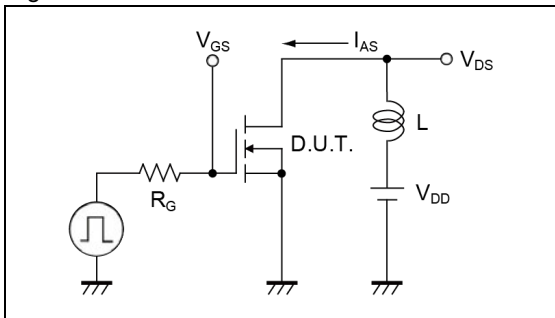
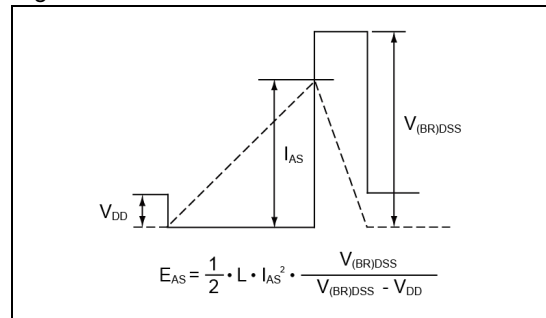


Fig.3-2 AVALANCHE WAVEFORM

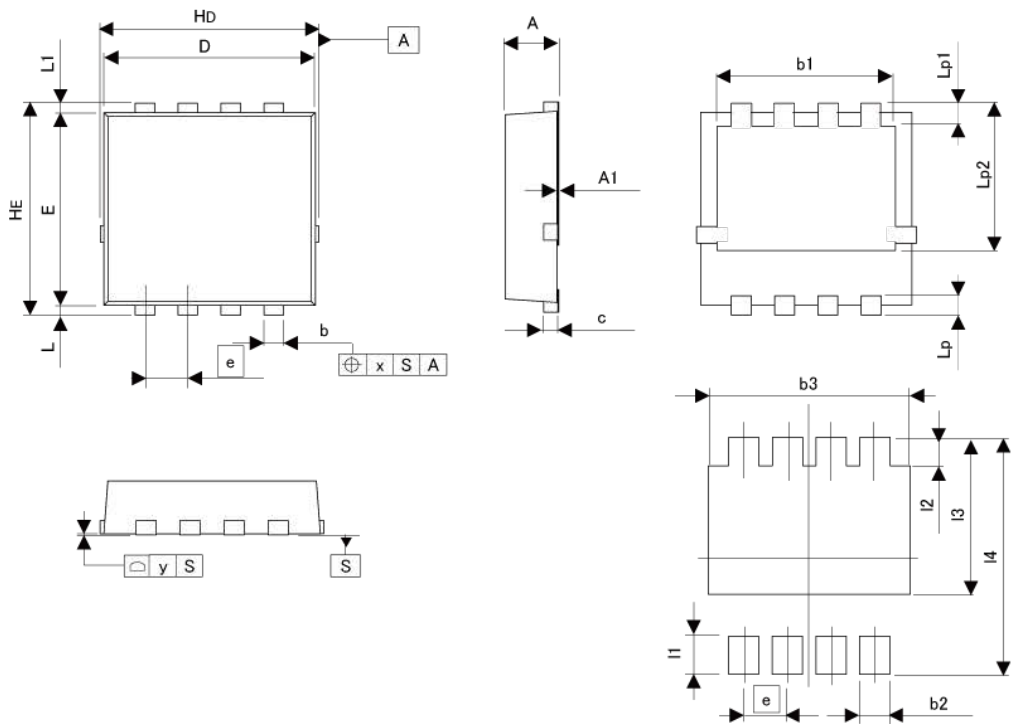


● Notice

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

●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
i1	-	0.50	-	0.020
i2	-	0.55	-	0.022
i3	-	2.40	-	0.094
i4	-	3.40	-	0.134

Dimension in mm/inches

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RQ3E180AJ - Web Page

Part Number	RQ3E180AJ
Package	HSMT8
Unit Quantity	3000
Minimum Package Quantity	3000
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes