

V_{DSS}	30V
$R_{DS(on)}(Max.)$	9.3m Ω
I_D	$\pm 12A$
P_D	2W

●Features

- 1) Low on - resistance.
- 2) High Power Package (HSMT8).
- 3) Pb-free lead plating ; RoHS compliant.
- 4) Halogen Free.

●Application

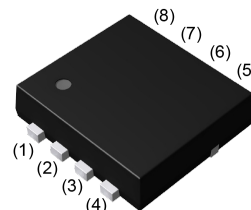
Switching

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

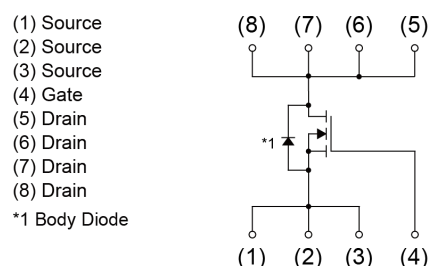
Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	30	V
Continuous drain current	I_D	± 12	A
Pulsed drain current	$I_{D,pulse}^{*1}$	± 48	A
Gate - Source voltage	V_{GSS}	± 20	V
Power dissipation	P_D^{*2}	2	W
Junction temperature	T_j	150	$^\circ C$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ C$

●Outline

HSMT8



●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	E120BN

● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}^{*2}	-	62.5	-	°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	-	21	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10V, I_D = 1mA$	1.0	-	2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	-3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 10V, I_D = 12A$	-	6.6	9.3	mΩ
		$V_{GS} = 4.5V, I_D = 12A$	-	8.6	11.9	
Forward Transfer Admittance	$ Y_{fs} ^{*3}$	$V_{DS} = 5V, I_D = 12A$	13	-	-	S

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

*2 Mounted on a ceramic board (30×30×0.8mm)

*3 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	1500	-	pF
Output capacitance	C_{oss}	$V_{DS} = 15V$	-	175	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	140	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} \approx 15V, V_{GS} = 10V$	-	9	-	ns
Rise time	t_r^{*3}	$I_D = 6A$	-	30	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L \approx 2.5\Omega$	-	46	-	
Fall time	t_f^{*3}	$R_G = 10\Omega$	-	12	-	

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

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g^{*3}	$V_{DD} \approx 15V$ $I_D = 12A$	$V_{GS} = 10V$	-	29	-	nC
Gate - Source charge	Q_{gs}^{*3}		$V_{GS} = 4.5V$	-	14	-	
Gate - Drain charge	Q_{gd}^{*3}			-	3.3	-	
				-	4.7	-	

●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	$T_a = 25^\circ\text{C}$	-	-	1.67	A
Body diode pulse current	I_{SP}^{*1}		-	-	48	A
Forward voltage	V_{SD}^{*3}	$V_{GS} = 0V, I_S = 1.67A$	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

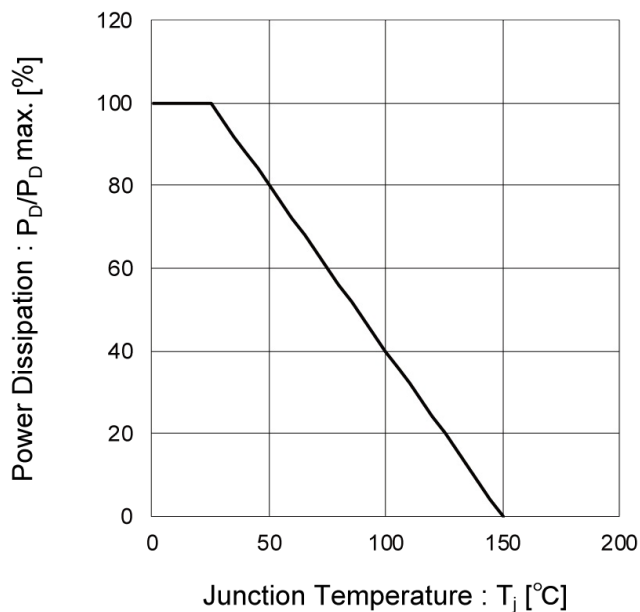


Fig.2 Maximum Safe Operating Area

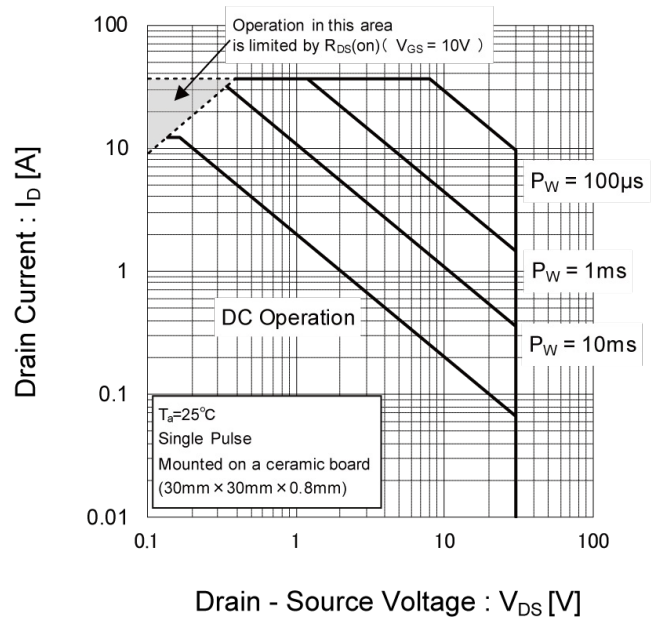


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

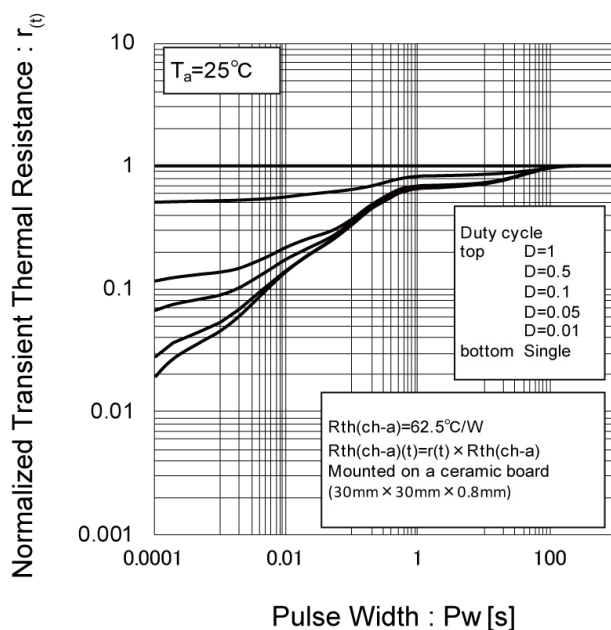
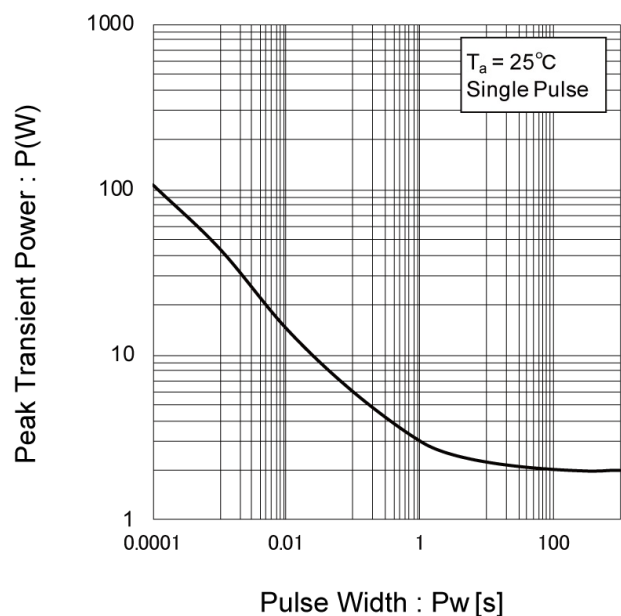


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

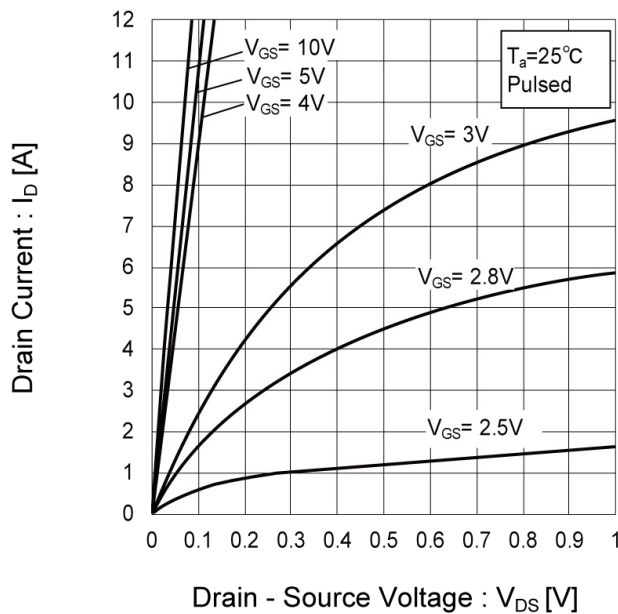


Fig.6 Typical Output Characteristics(II)

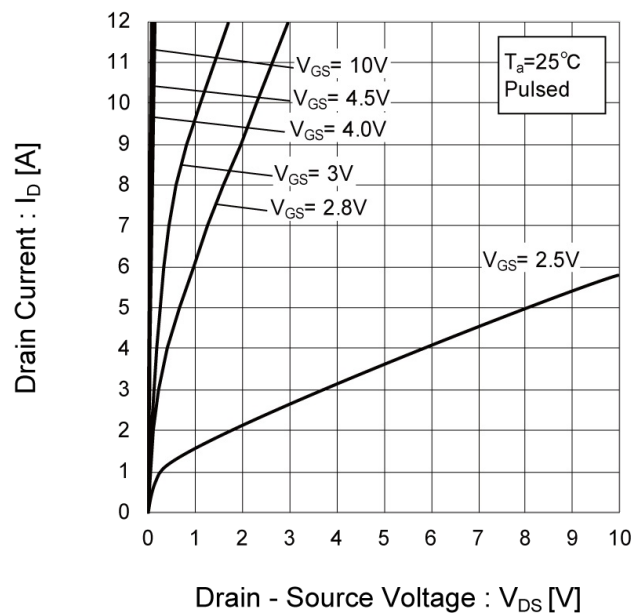
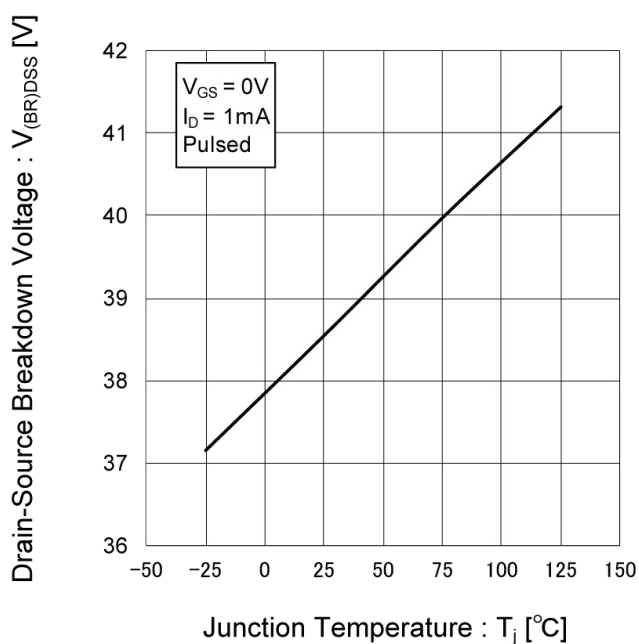


Fig.7 Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

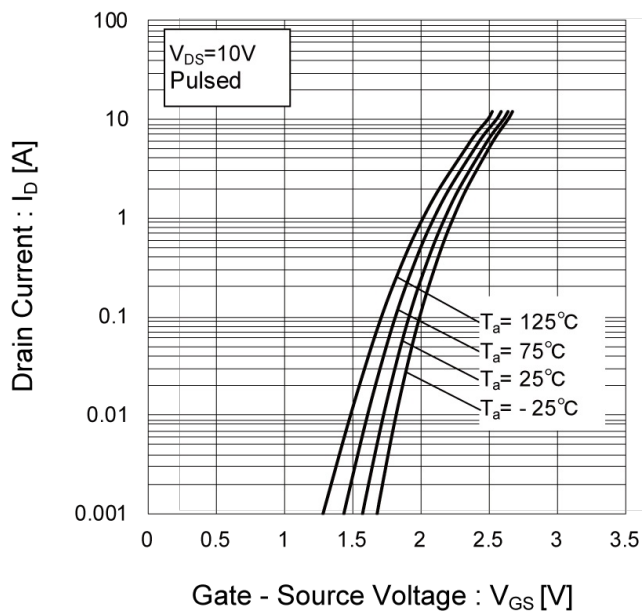


Fig.9 Gate Threshold Voltage vs. Junction Temperature

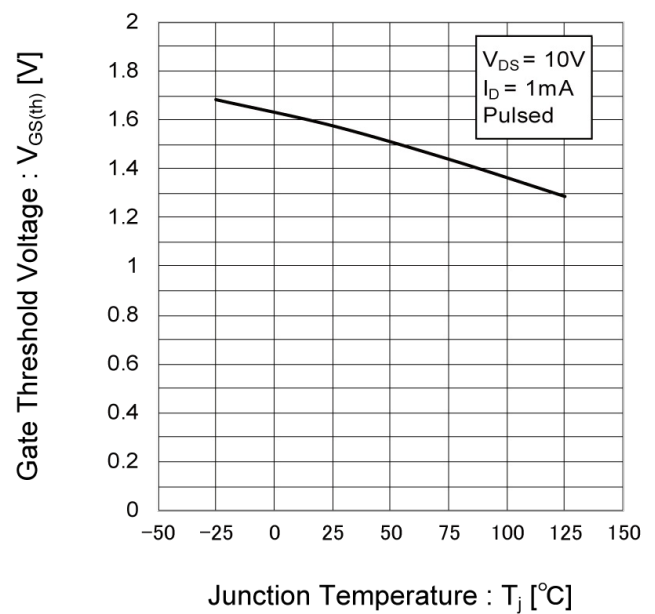
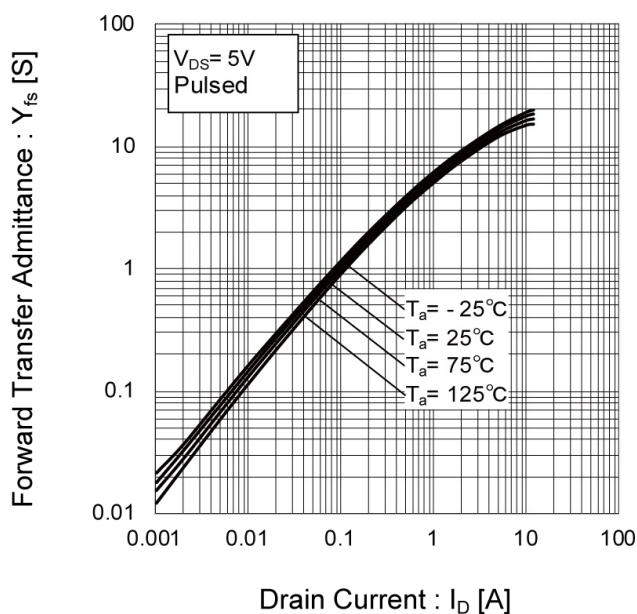


Fig.10 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.11 Drain Current Derating Curve



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

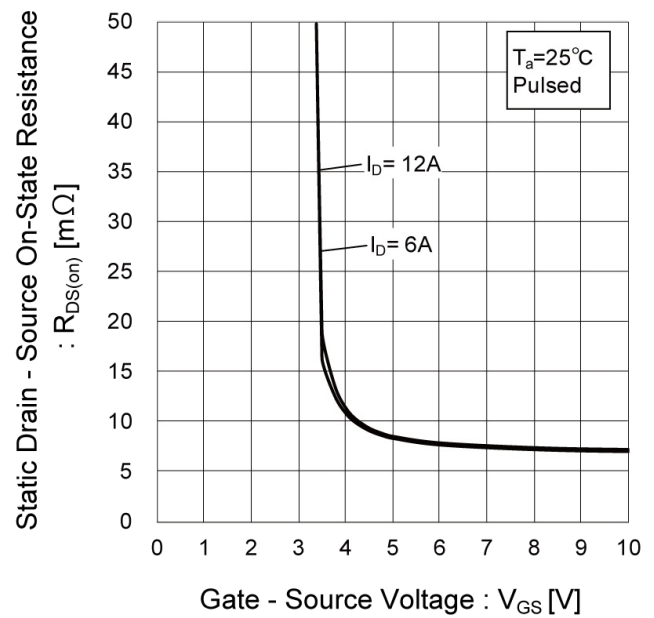
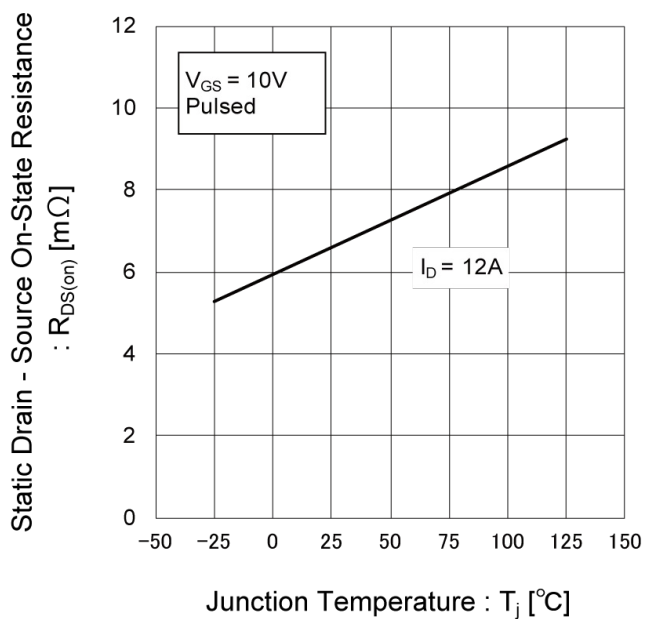


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

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

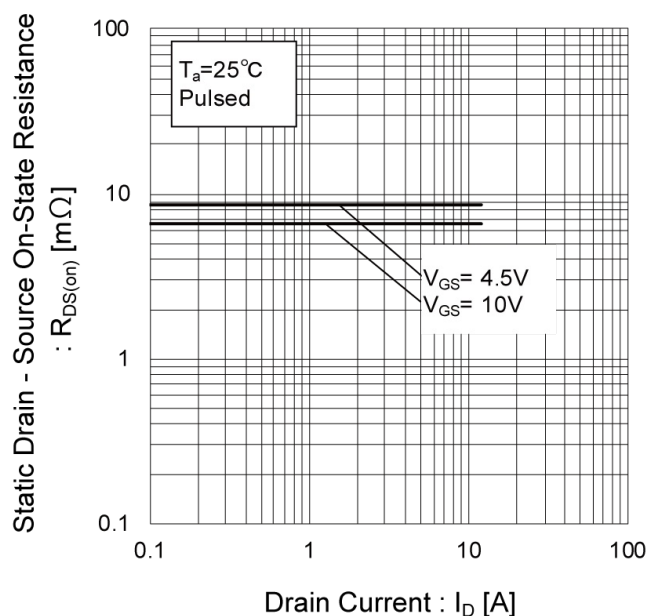


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

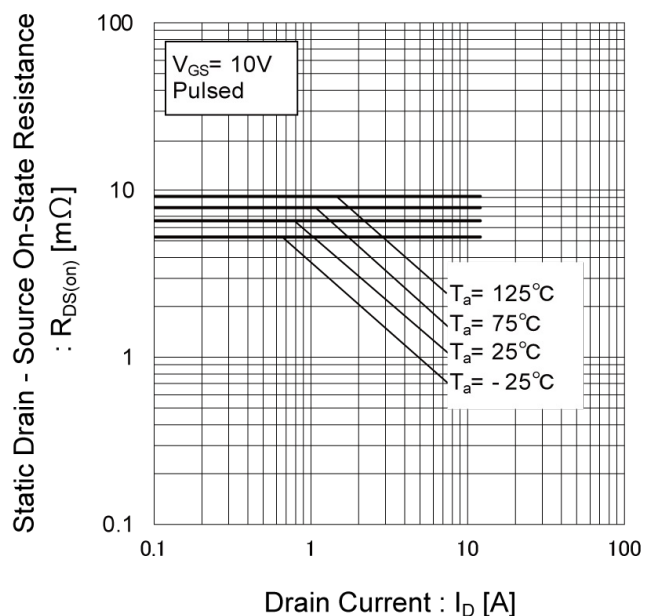
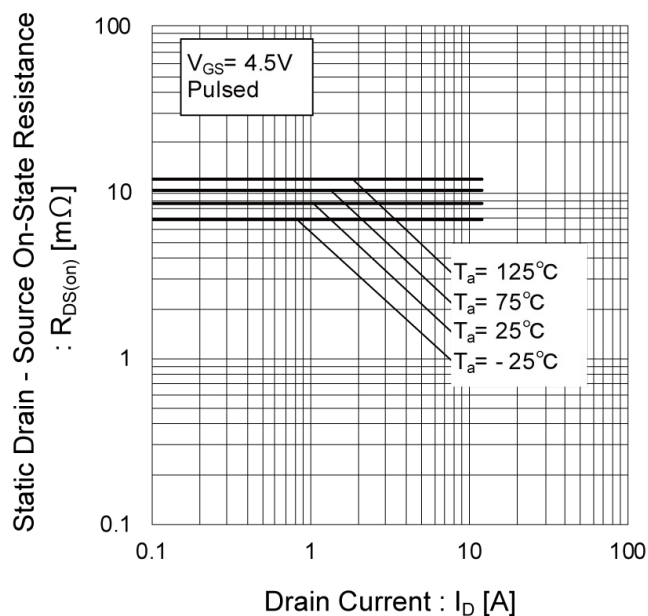


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

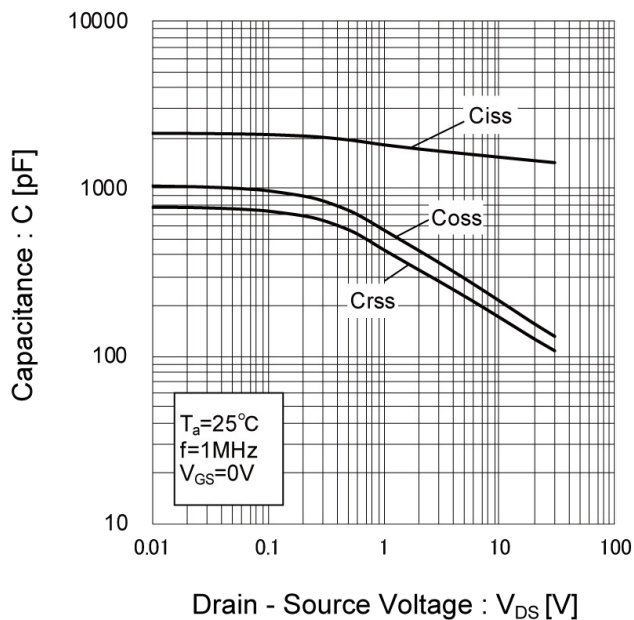


Fig.18 Switching Characteristics

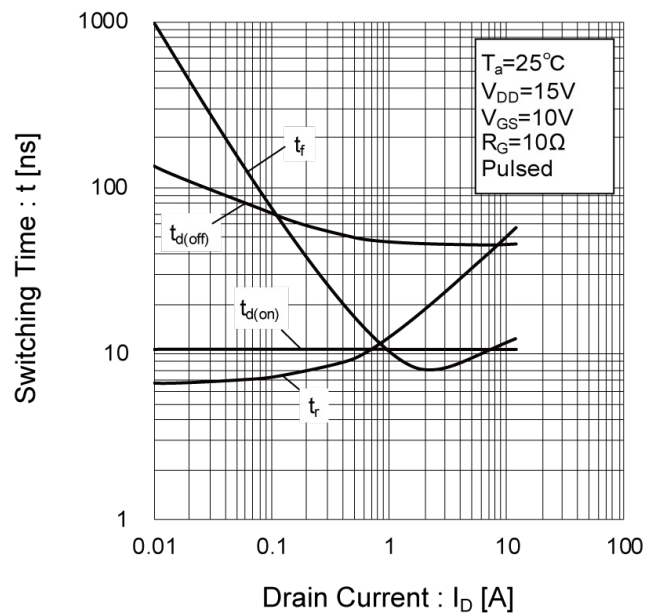


Fig.19 Dynamic Input Characteristics

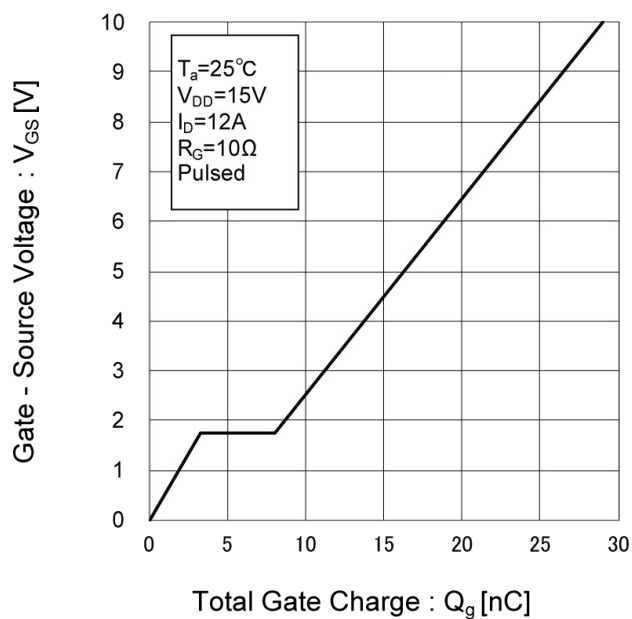
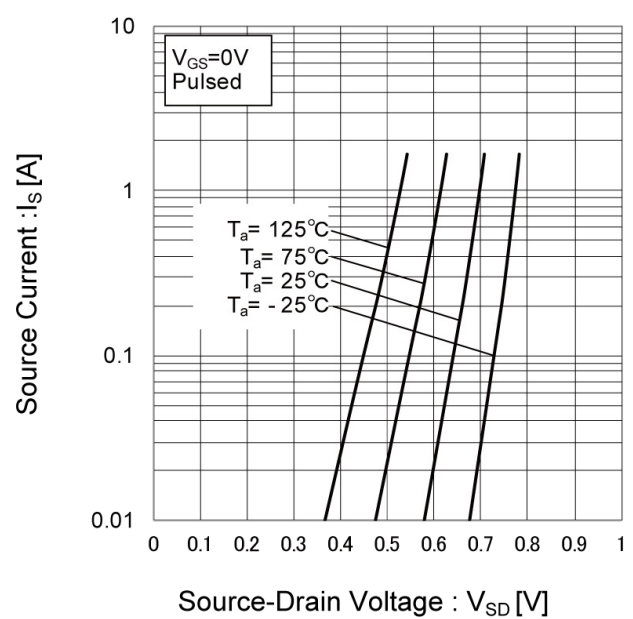


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

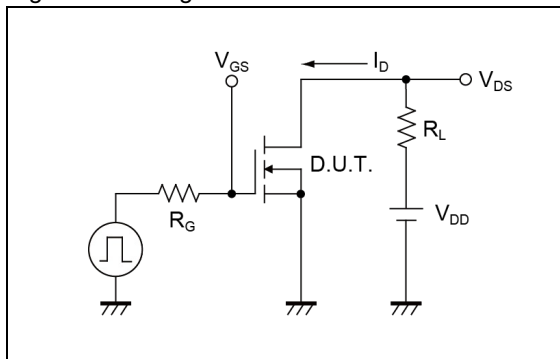


Fig.1-2 Switching Waveforms

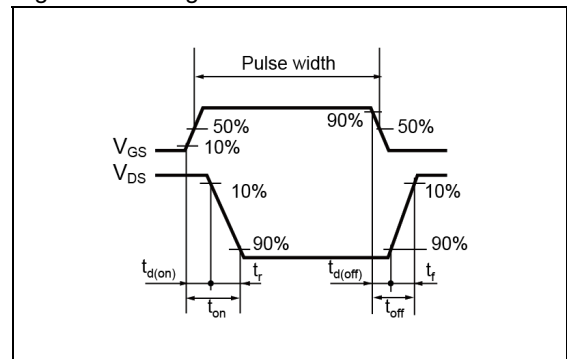


Fig.2-1 Gate Charge Measurement Circuit

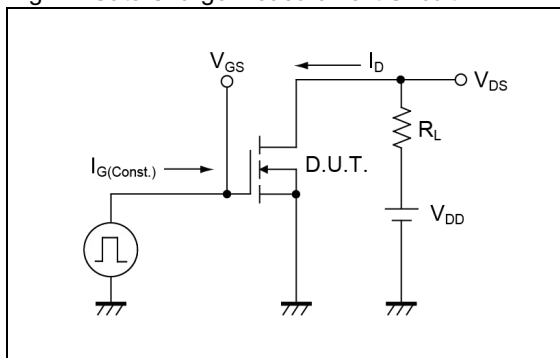
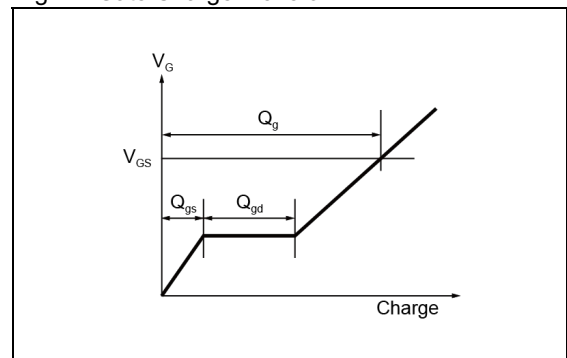


Fig.2-2 Gate Charge Waveform



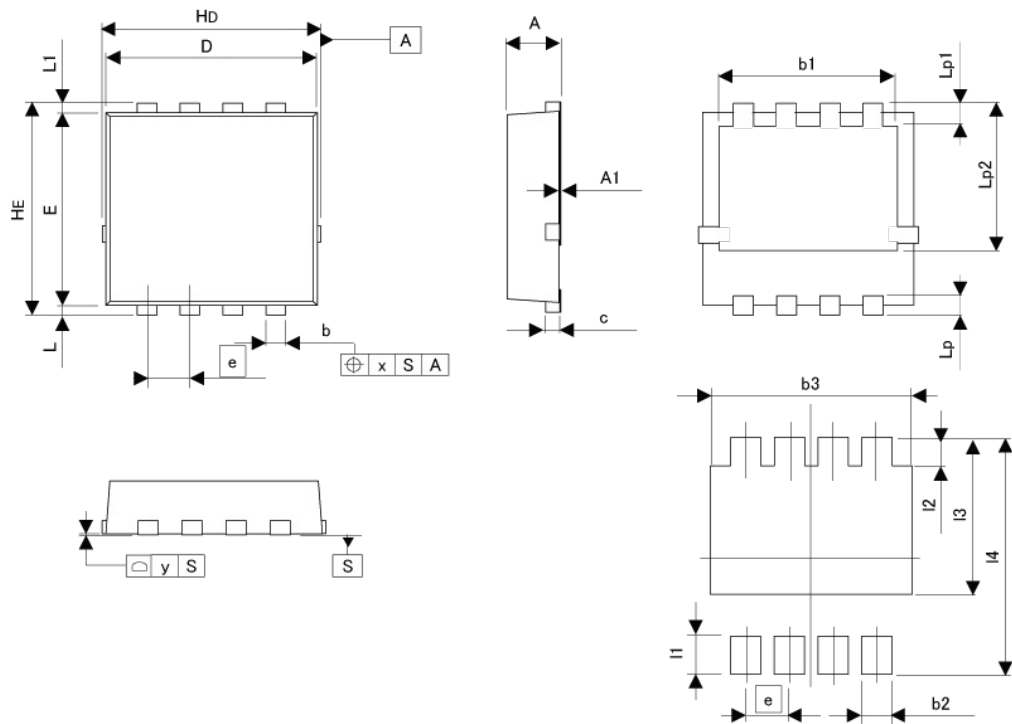
● Notice

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
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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RQ3E120BN - Web Page

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Part Number	RQ3E120BN
Package	HSMT8
Unit Quantity	3000
Minimum Package Quantity	3000
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes

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