

V_{DSS}	100V
$R_{DS(on)}(Max.)$	15.6mΩ
I_D	±40A
P_D	59W

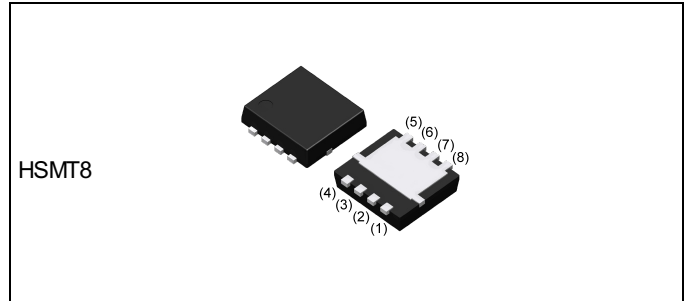
●Features

- 1) Low on - resistance
- 2) High power package (HSMT8)
- 3) Pb-free plating ; RoHS compliant
- 4) Halogen free
- 5) 100% Rg and UIS tested

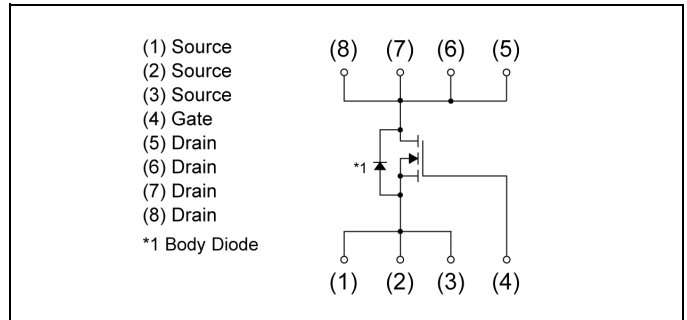
●Application

Switching

●Outline



●Inner circuit



●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Quantity (pcs)	3000
	Taping code	TB1
	Marking	P040BH

●Absolute maximum ratings ($T_a = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	100	V
Continuous drain current	I_D^{*1}	±40	A
Pulsed drain current	I_{DP}^{*2}	±160	A
Gate - Source voltage	V_{GSS}	±20	V
Avalanche current, single pulse	I_{AS}^{*3}	20	A
Avalanche energy, single pulse	E_{AS}^{*3}	32	mJ
Power dissipation	P_D^{*1}	59	W
	P_D^{*4}	2.0	W
Junction temperature	T_j	150	°C
Operating junction and storage temperature range	T_{stg}	-55 to +150	°C

● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}^{*1}	-	-	2.1	°C/W
Thermal resistance, junction - ambient	R_{thJA}^{*4}	-	-	62.5	°C/W

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	100	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	62.3	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 100V, V_{GS} = 0V$	-	-	5	μA
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 500	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1mA$	2.0	-	4.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	-4.5	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = 10V, I_D = 40A$	-	12.0	15.6	m Ω
		$V_{GS} = 6V, I_D = 20A$	-	15.6	23.3	
Gate resistance	R_G	-	-	2	-	Ω
Forward Transfer Admittance	$ Y_{fs} ^{*5}$	$V_{DS} = 5V, I_D = 20A$	15	-	-	S

*1 $T_c = 25^\circ\text{C}$, Limited only by maximum temperature allowed.

*2 $P_w \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*3 $L \approx 0.1\text{mH}$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_j = 25^\circ\text{C}$ Fig.3-1,3-2

*4 Mounted on a Cu board (40×40×0.8mm)

*5 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C _{iss}	V _{GS} = 0V	-	1080	-	pF
Output capacitance	C _{oss}	V _{DS} = 50V	-	205	-	
Reverse transfer capacitance	C _{rss}	f = 1MHz	-	12	-	
Turn - on delay time	t _{d(on)} ^{*5}	V _{DD} ≈ 50V, V _{GS} = 10V	-	19	-	ns
Rise time	t _r ^{*5}	I _D = 20A	-	20	-	
Turn - off delay time	t _{d(off)} ^{*5}	R _L ≈ 2.5Ω	-	35	-	
Fall time	t _f ^{*5}	R _G = 10Ω	-	13	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit	
			Min.	Typ.	Max.		
Total gate charge	Q _g ^{*5}	V _{DD} ≈ 50V I _D = 40A	V _{GS} = 10V	-	16.7	-	nC
Gate - Source charge	Q _{gs} ^{*5}		V _{GS} = 6V	-	10.9	-	
Gate - Drain charge	Q _{gd} ^{*5}			-	3.8	-	
				-	4.4	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I _S	T _a = 25°C	-	-	40	A
Pulse forward current	I _{SP} ^{*2}		-	-	160	A
Forward voltage	V _{SD} ^{*5}	V _{GS} = 0V, I _S = 40A	-	-	1.2	V
Reverse recovery time	t _{rr} ^{*5}	I _S = 40A, V _{GS} = 0V	-	48	-	ns
Reverse recovery charge	Q _{rr} ^{*5}	di/dt = 100A/μs	-	109	-	nC

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve



Fig.2 Maximum Safe Operating Area

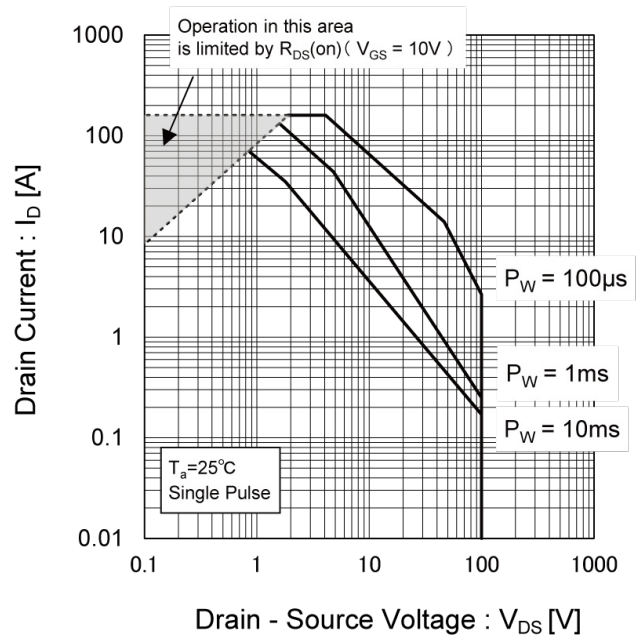


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

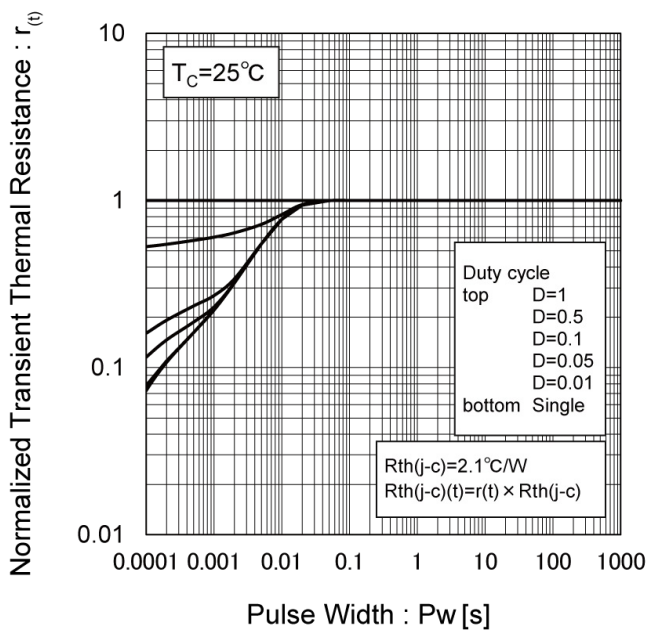
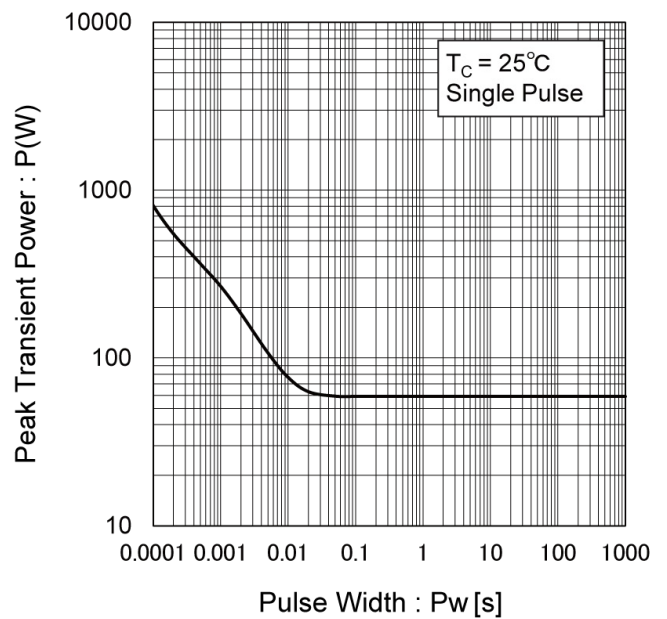


Fig.4 Single Pulse Maximum Power Dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

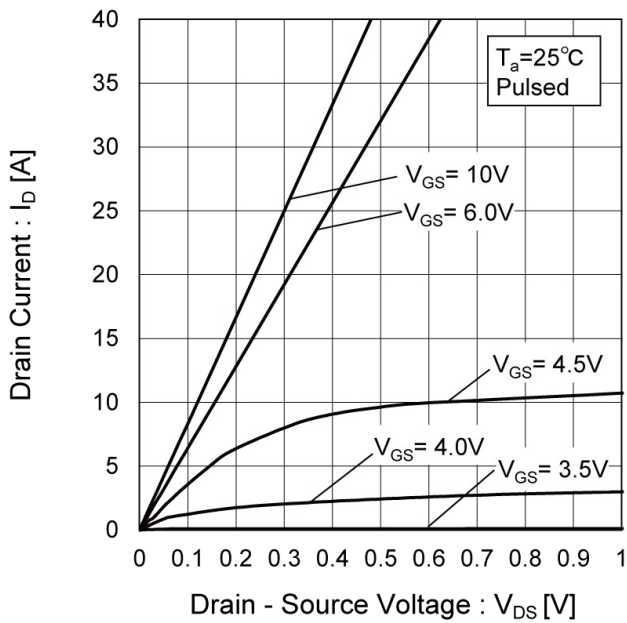


Fig.6 Typical Output Characteristics(II)

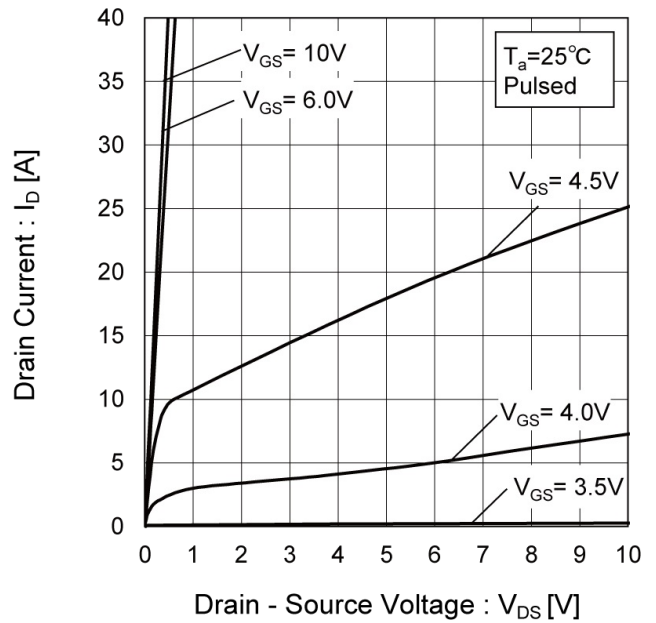


Fig.7 Breakdown Voltage vs. Junction Temperature

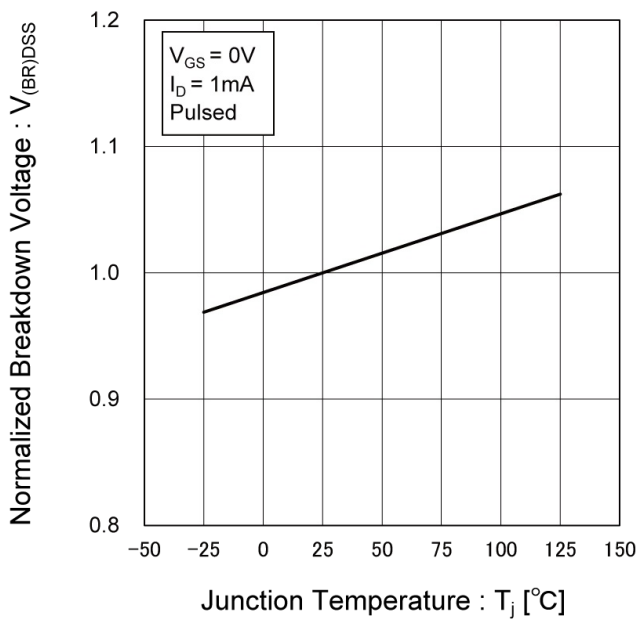
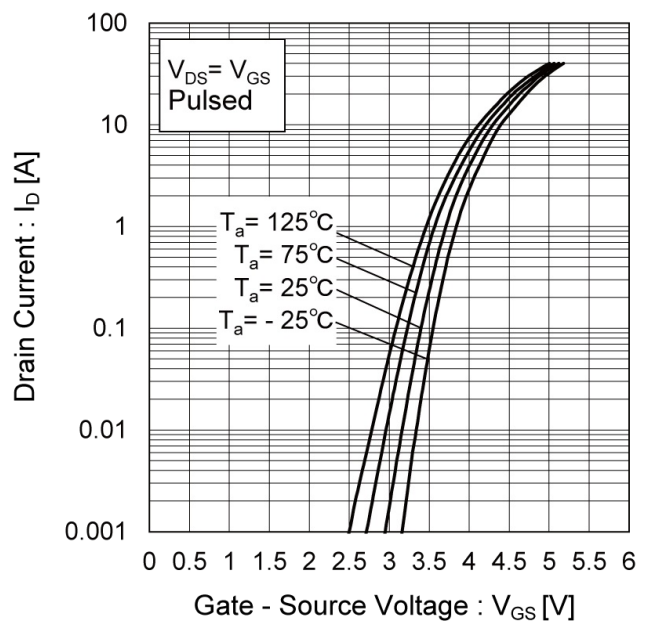


Fig.8 Typical Transfer Characteristics



● Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

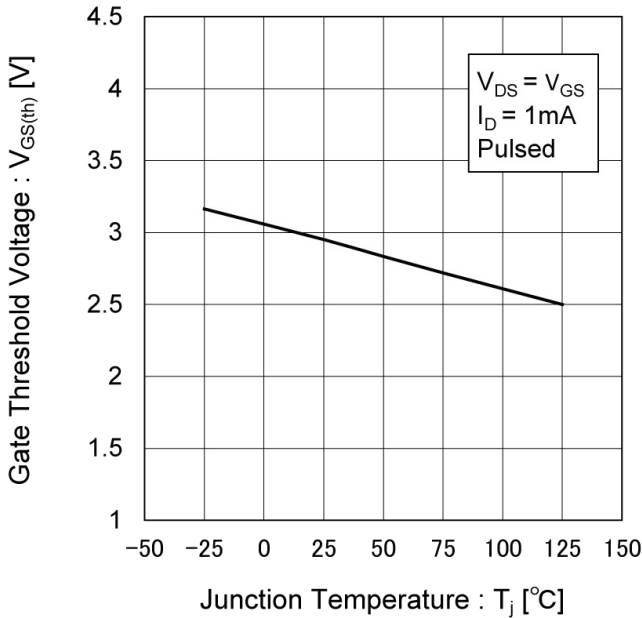


Fig.10 Forward Transfer Admittance vs. Drain Current

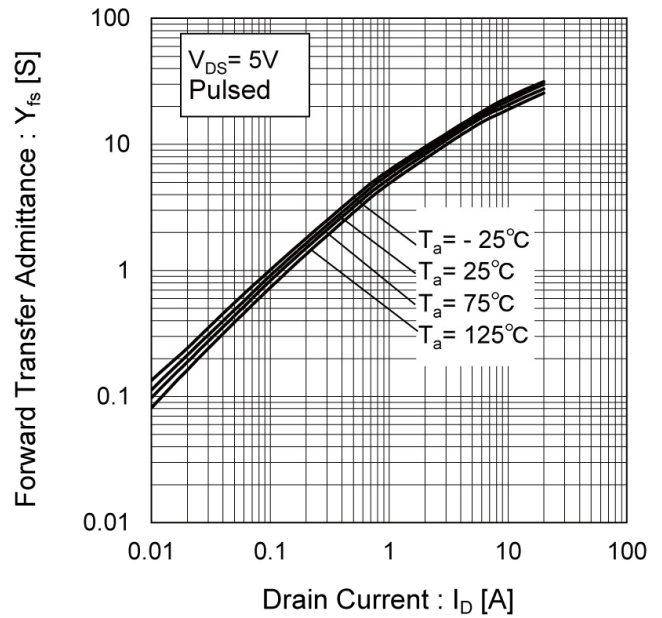


Fig.11 Drain Current Derating Curve

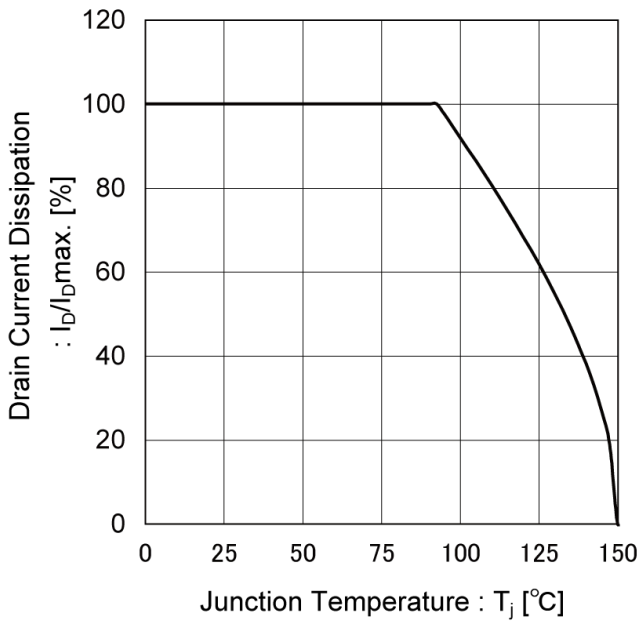
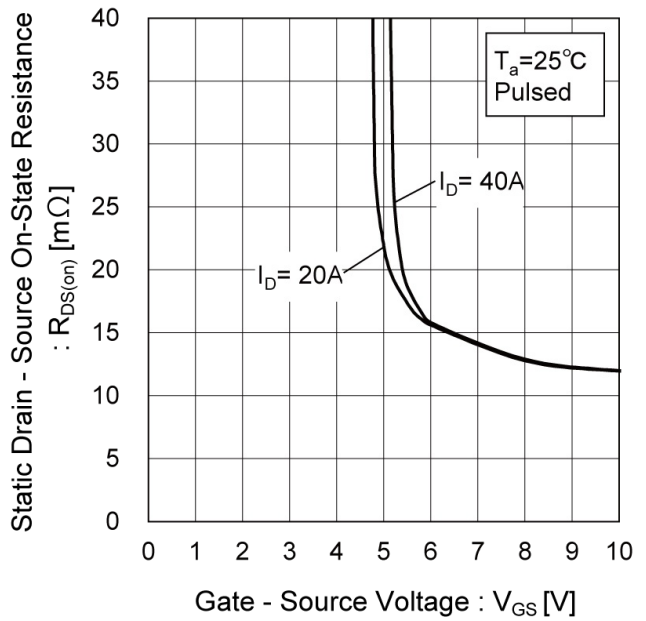


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



● Electrical characteristic curves

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

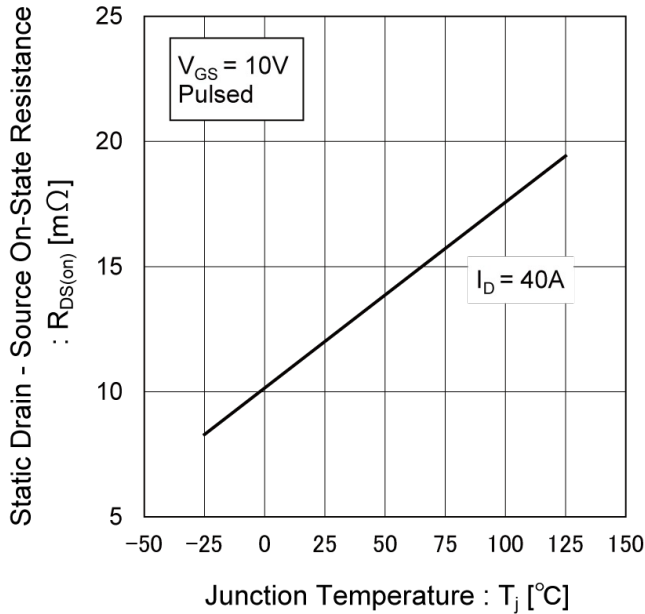


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current (I)

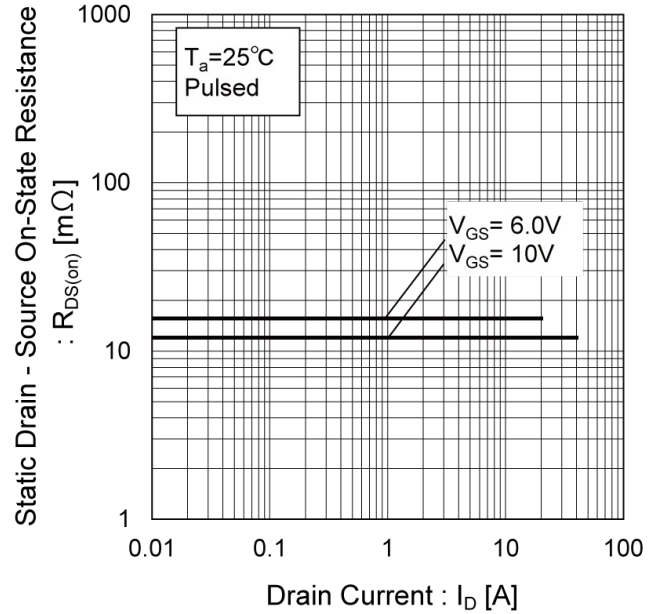


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)

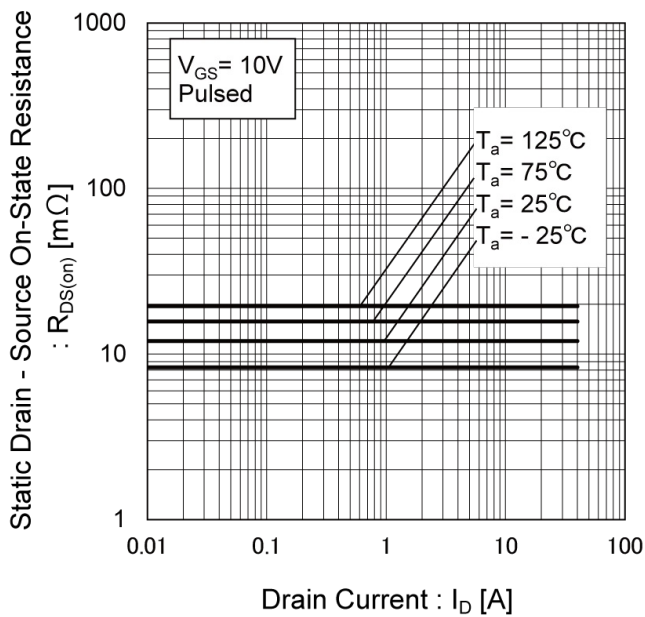
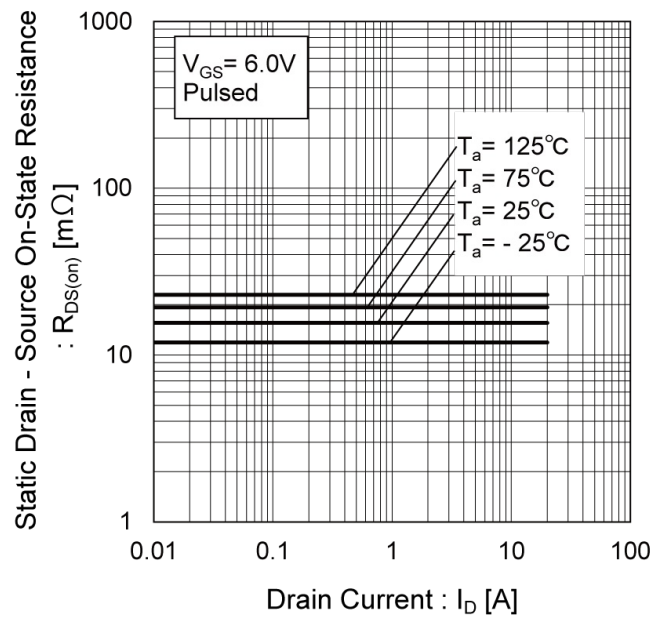


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)



● Electrical characteristic curves

Fig.17 Typical Capacitances vs. Drain - Source Voltage

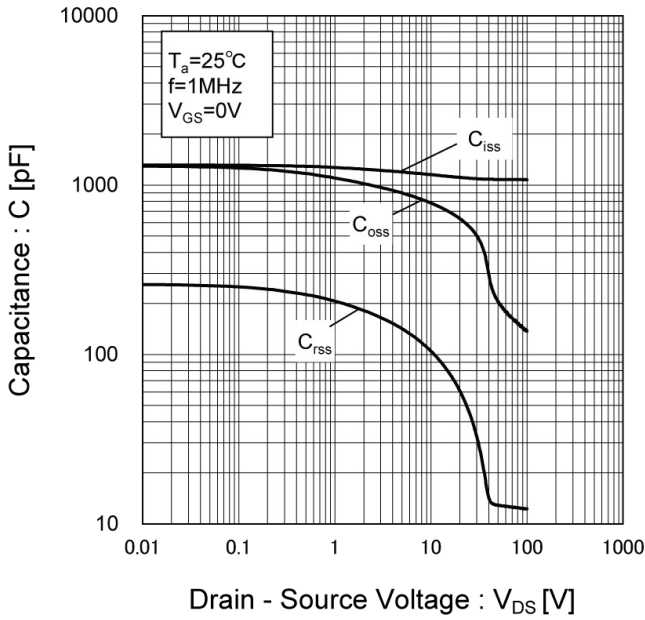


Fig.18 Switching Characteristics

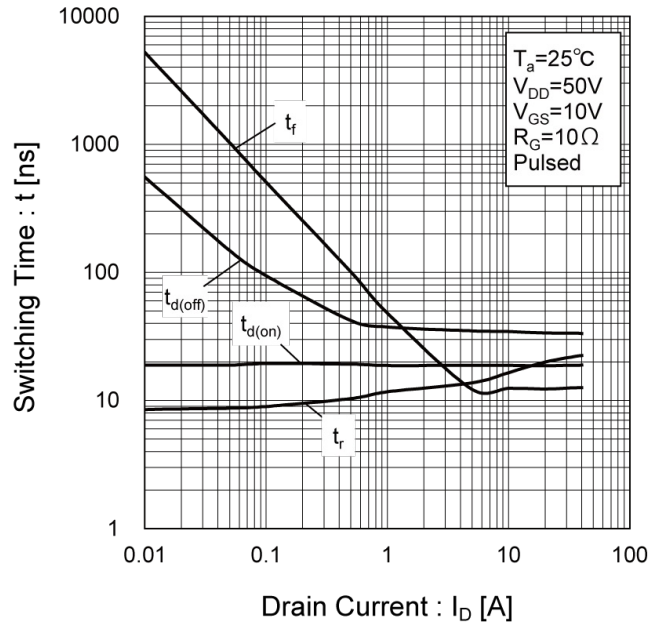


Fig.19 Typical Gate Charge

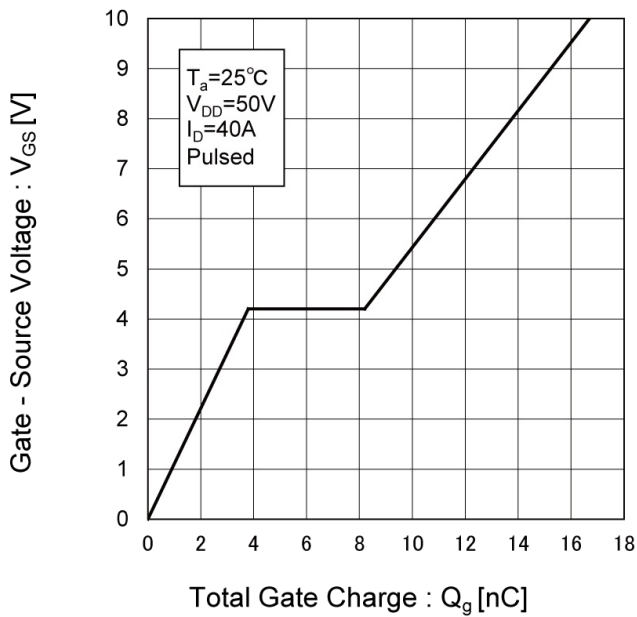
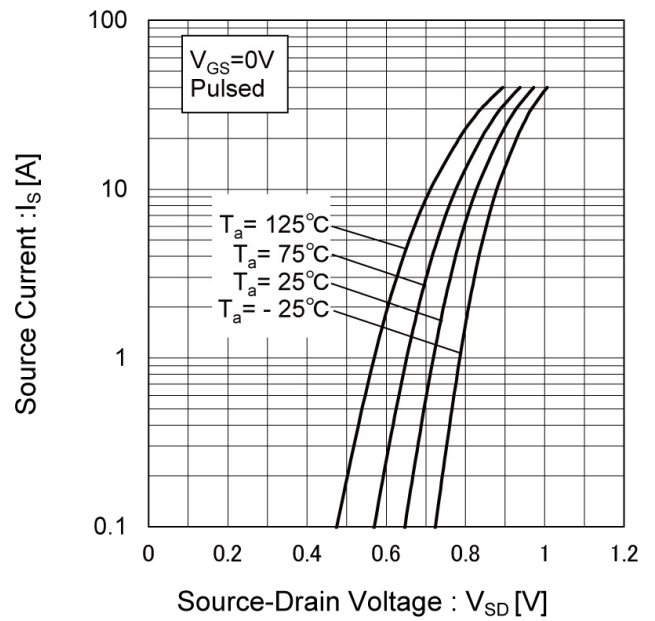


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit



Fig.1-2 Switching Waveforms

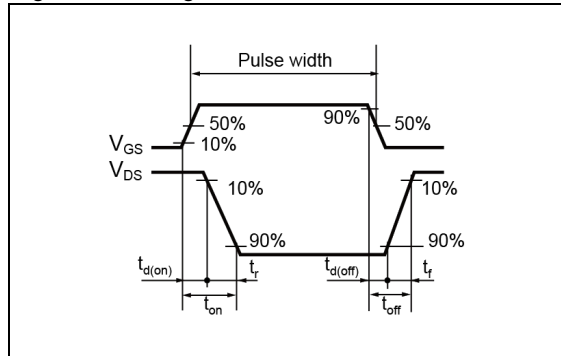


Fig.2-1 Gate Charge Measurement Circuit

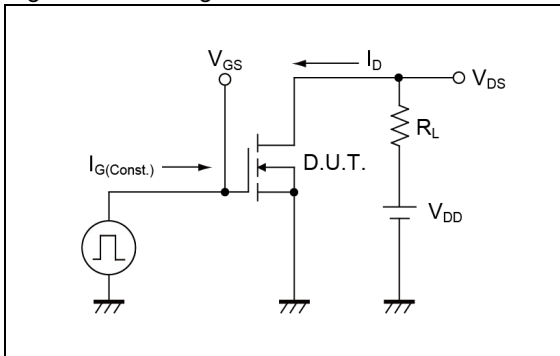


Fig.2-2 Gate Charge Waveform

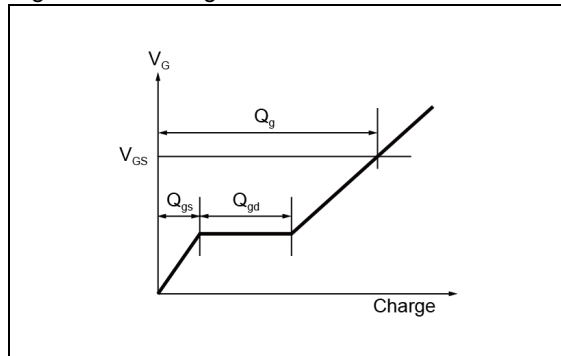


Fig.3-1 Avalanche Measurement Circuit

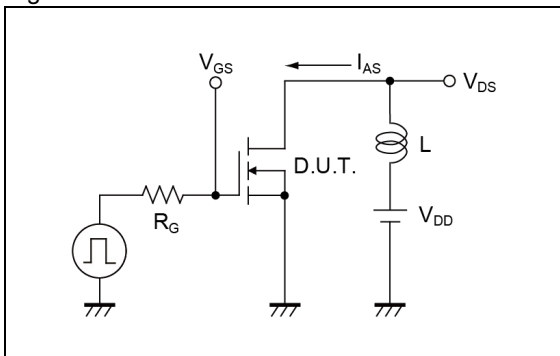
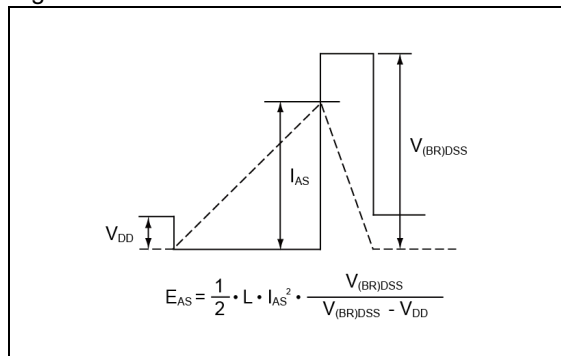


Fig.3-2 Avalanche Waveform

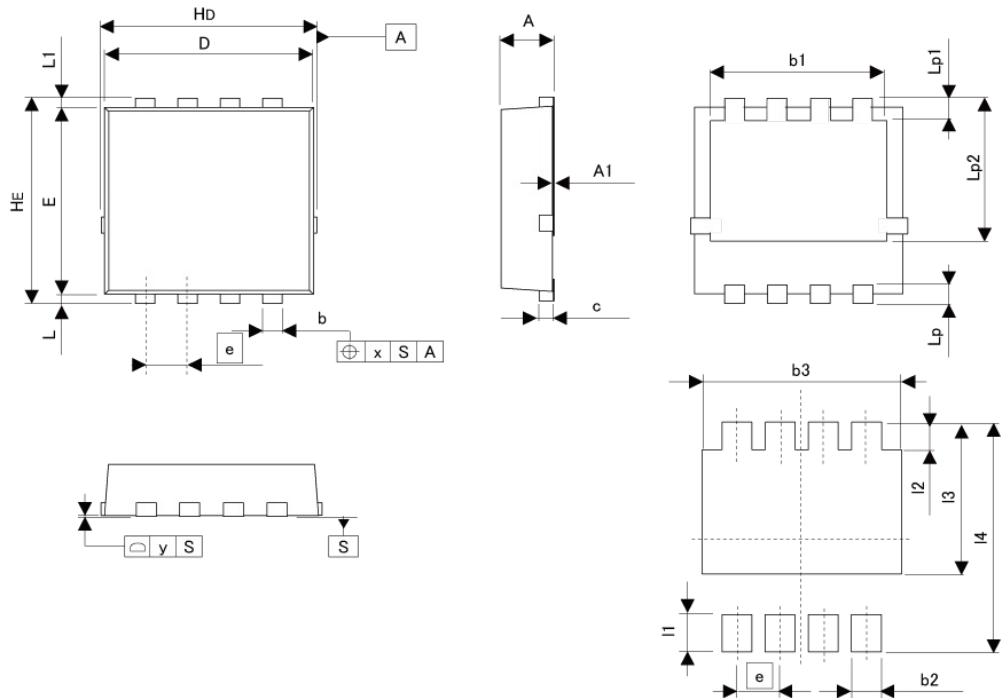


● Notice

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

●Dimensions

HSMT8 (TB1)
(3.3x3.3)



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85	0.026	0.033
A1	0.00	0.10	0.000	0.004
b	0.24	0.42	0.009	0.017
b1	2.29	2.69	0.090	0.106
c	0.05	0.25	0.002	0.010
D	3.05	3.25	0.120	0.128
E	2.95	3.15	0.116	0.124
e	0.65		0.026	
HD	3.20	3.40	0.126	0.134
HE	3.20	3.40	0.126	0.134
L	0.05	0.23	0.002	0.009
L1	0.05	0.23	0.002	0.009
Lp	0.20	0.60	0.008	0.024
Lp1	0.20	0.60	0.008	0.024
Lp2	1.83	2.63	0.072	0.104
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.52	-	0.020
b3	-	2.79	-	0.110
I1	-	0.70	-	0.028
I2	-	0.70	-	0.028
I3	-	2.53	-	0.100
I4	-	3.60	-	0.142

Dimension in mm/inches