

V_{DSS}	40V
$R_{DS(on)}(Max.)$	2.5m Ω
I_D	$\pm 30A$
P_D	3W

●Features

- 1) Low on - resistance.
- 2) High Power Package (HSOP8).
- 3) Pb-free lead plating ; RoHS compliant.
- 4) Halogen Free.
- 5) 100% Rg and UIS tested.

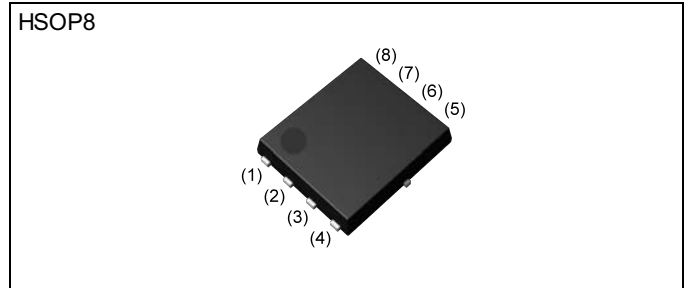
●Application

High-Efficiency DC/DC converter application.
Motor Drivers

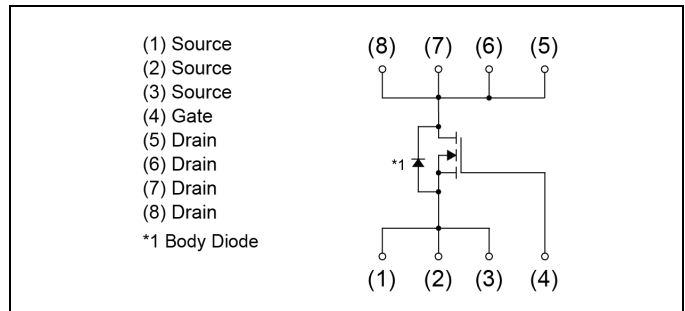
●Absolute maximum ratings ($T_a = 25^\circ C$)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	40	V
Continuous drain current	I_D	± 30	A
Pulsed drain current	$I_{D,pulse}^{*1}$	± 120	A
Gate - Source voltage	V_{GSS}	± 20	V
Avalanche energy, single pulse	E_{AS}^{*5}	136	mJ
Avalanche current	I_{AS}^{*5}	30	A
Power dissipation	P_D^{*2}	3	W
	P_D^{*3}	35	W
Junction temperature	T_j	150	$^\circ C$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ C$

●Outline



●Inner circuit



●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2500
	Taping code	TB
	Marking	RS1G300GN

● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}^{*2}	-	41.7	-	°C/W
Thermal resistance, junction - case	R_{thJC}^{*3}	-	3.57	-	°C/W

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	40	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	26.2	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1mA$	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	-	-4.9	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 10V, I_D = 30A$	-	1.9	2.5	m Ω
		$V_{GS} = 4.5V, I_D = 30A$	-	2.4	3.0	
Gate input resistance	R_G		-	1.5	-	Ω
Transconductance	g_{fs}^{*4}	$V_{DS} = 5V, I_D = 30A$	36	-	-	S

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

*2 MOUNTED ON 40mm×40mm Cu BOARD

*3 $T_c = 25^\circ\text{C}$

*4 Pulsed

*5 $L \approx 0.2\text{mH}$, $V_{DD} = 20V$, $R_G = 25\Omega$, STARTING $T_j = 25^\circ\text{C}$ Fig.3-1,3-2

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C _{iss}	V _{GS} = 0V	-	4230	-	pF
Output capacitance	C _{oss}	V _{DS} = 20V	-	680	-	
Reverse transfer capacitance	C _{rss}	f = 1MHz	-	190	-	
Turn - on delay time	t _{d(on)} ^{*4}	V _{DD} ≈ 20V, V _{GS} = 10V	-	24.2	-	ns
Rise time	t _r ^{*4}	I _D = 15A	-	19.8	-	
Turn - off delay time	t _{d(off)} ^{*4}	R _L = 1.33Ω	-	89.7	-	
Fall time	t _f ^{*4}	R _G = 10Ω	-	38.3	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q _g ^{*4}	V _{DD} ≈ 20V, I _D = 30A V _{GS} = 4.5V	-	28.6	-	nC
		V _{DD} ≈ 20V, I _D = 30A V _{GS} = 10V	-	56.8	-	
Gate - Source charge	Q _{gs} ^{*4}	V _{DD} ≈ 20V, I _D = 30A	-	12.1	-	
Gate - Drain charge	Q _{gd} ^{*4}	V _{GS} = 4.5V	-	7.9	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I _S ^{*1}	T _a = 25°C	-	-	2.5	A
Forward voltage	V _{SD} ^{*4}	V _{GS} = 0V, I _S = 2.5A	-	-	1.2	V
Reverse recovery time	t _{rr} ^{*4}	I _S = 30A, V _{GS} = 0V	-	42	-	ns
Reverse recovery charge	Q _{rr} ^{*4}	di/dt = 100A/μs	-	47	-	nC

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

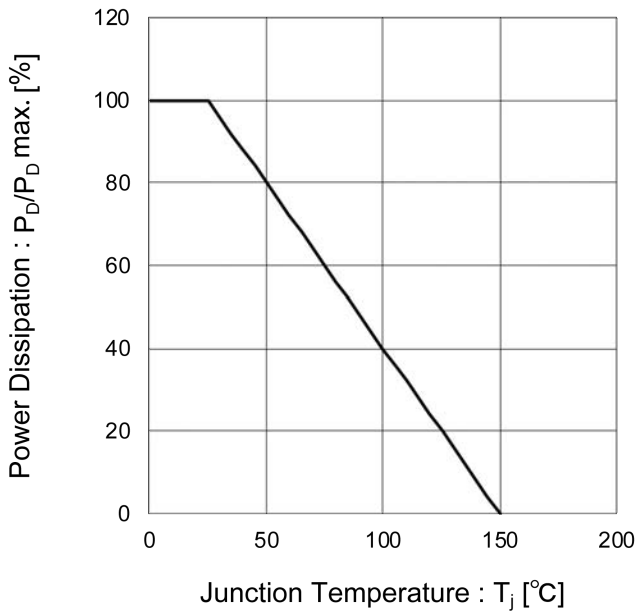


Fig.2 Maximum Safe Operating Area

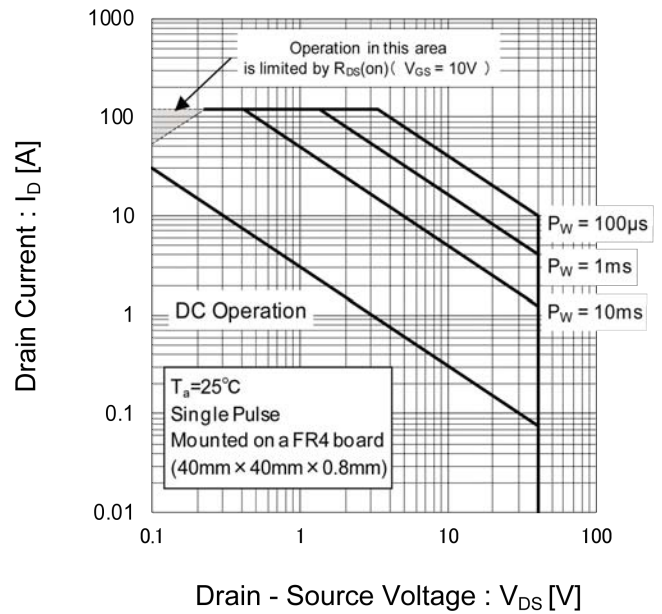


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

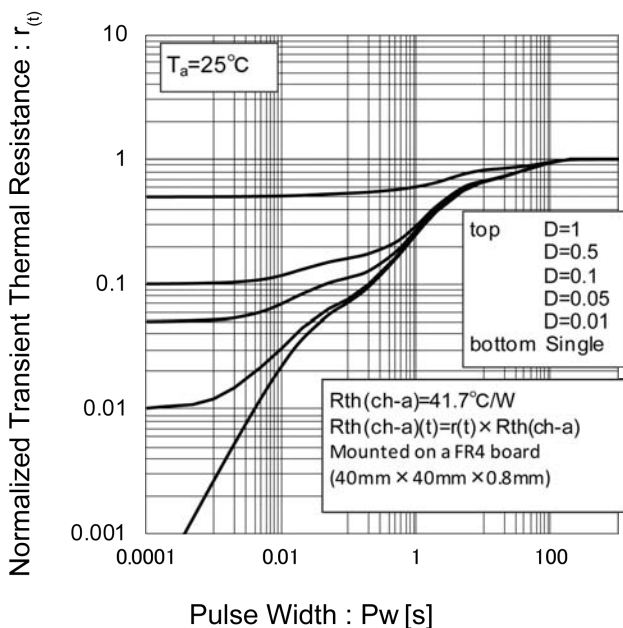
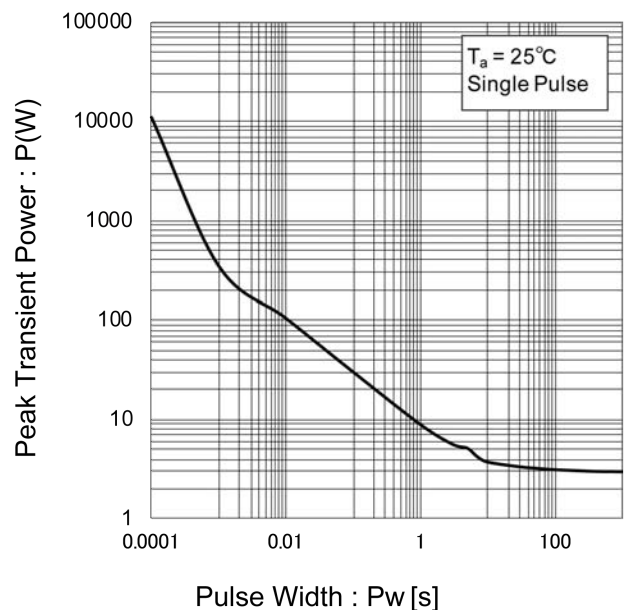


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

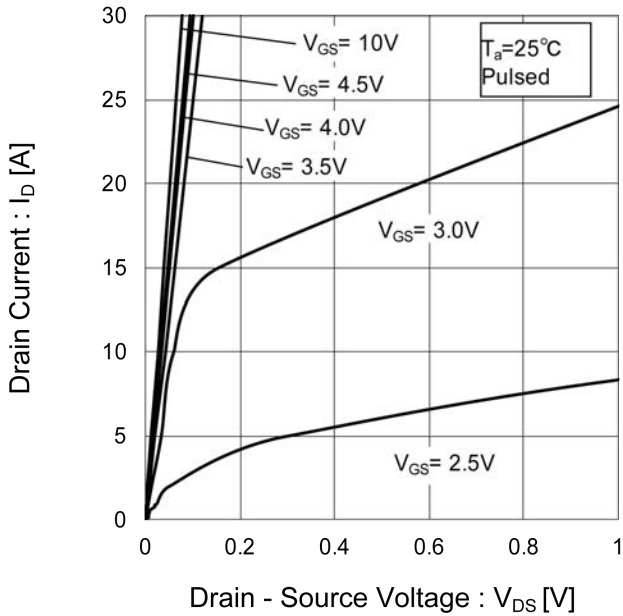


Fig.6 Typical Output Characteristics(II)

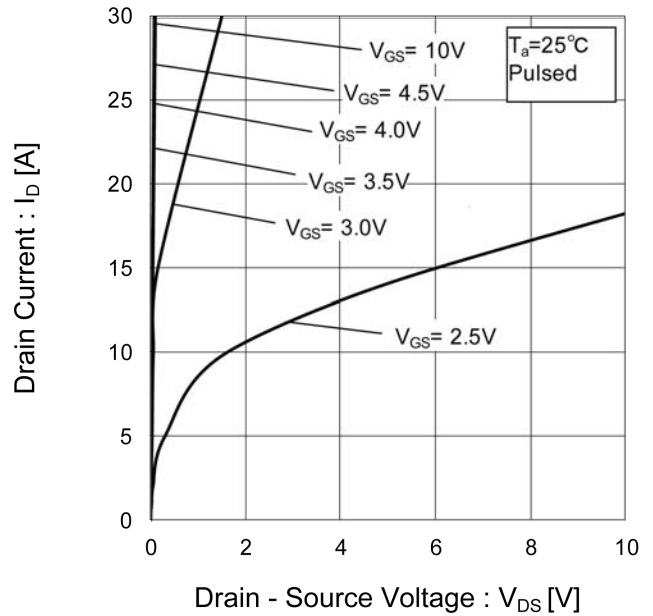
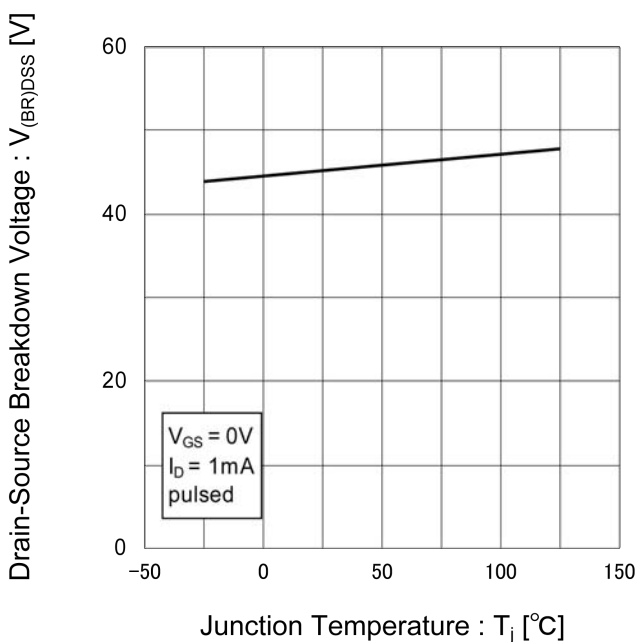


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

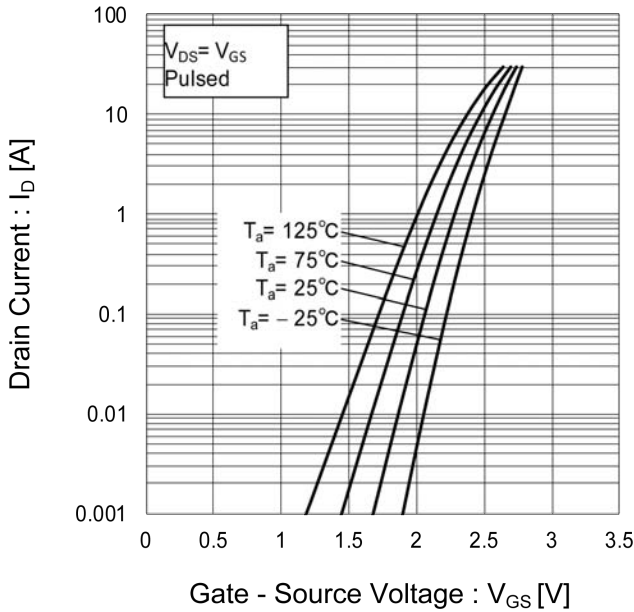


Fig.9 Gate Threshold Voltage vs. Junction Temperature

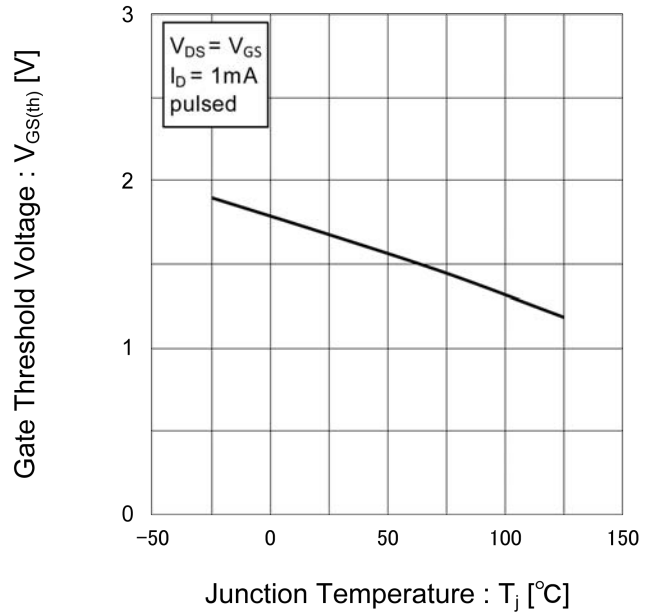
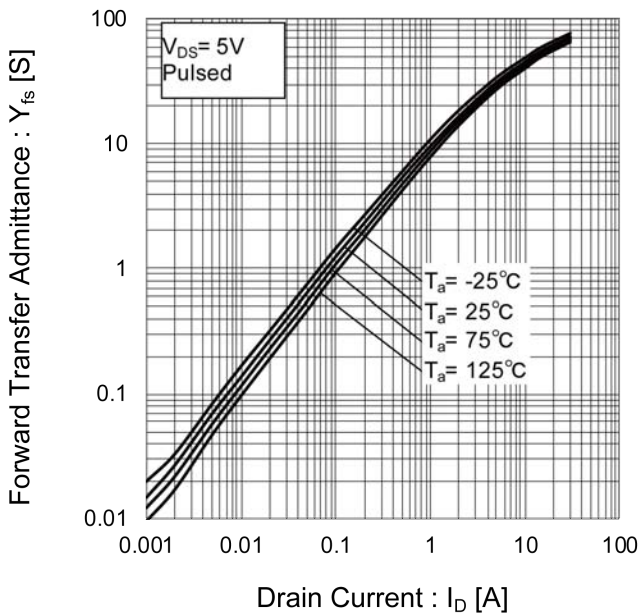


Fig.10 Forward Transfer Admittance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve

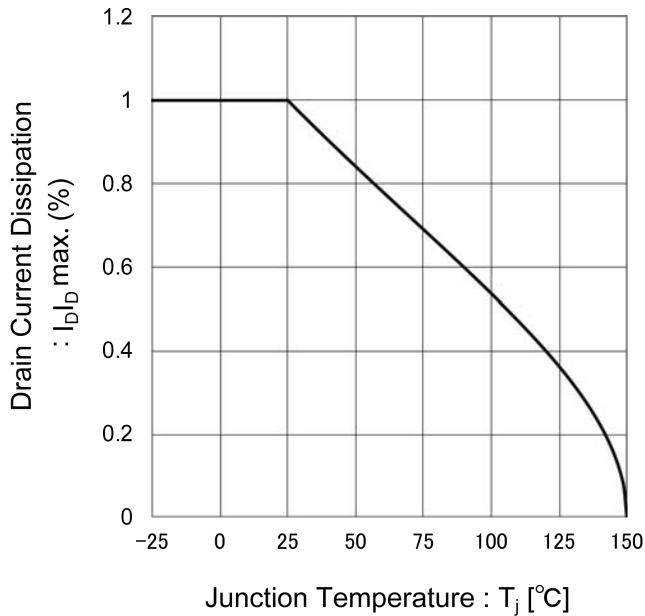


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

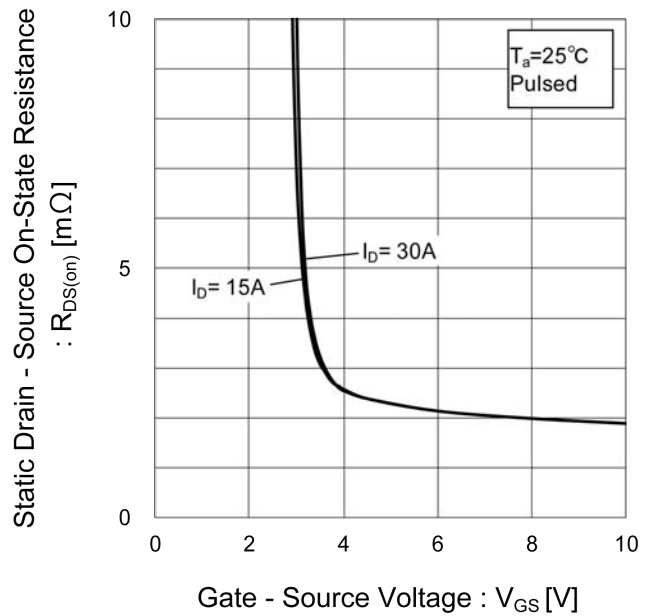
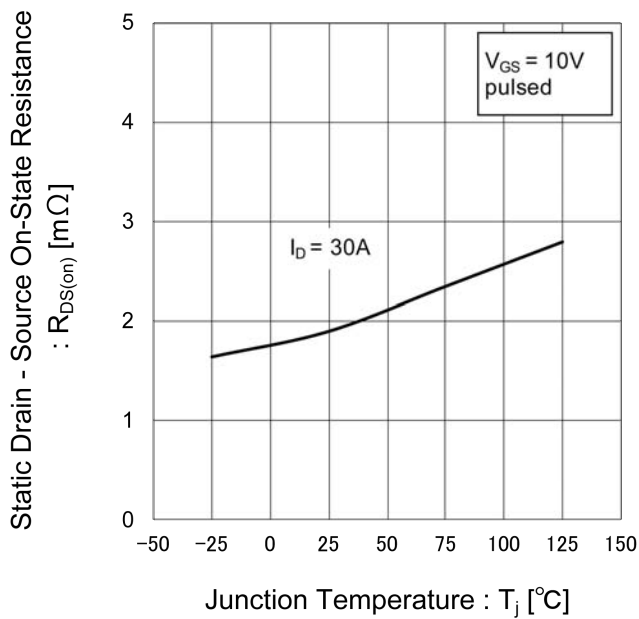


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

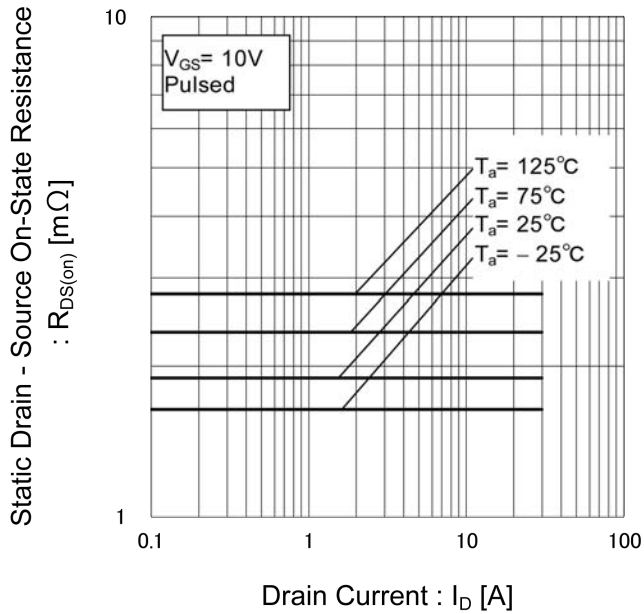


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

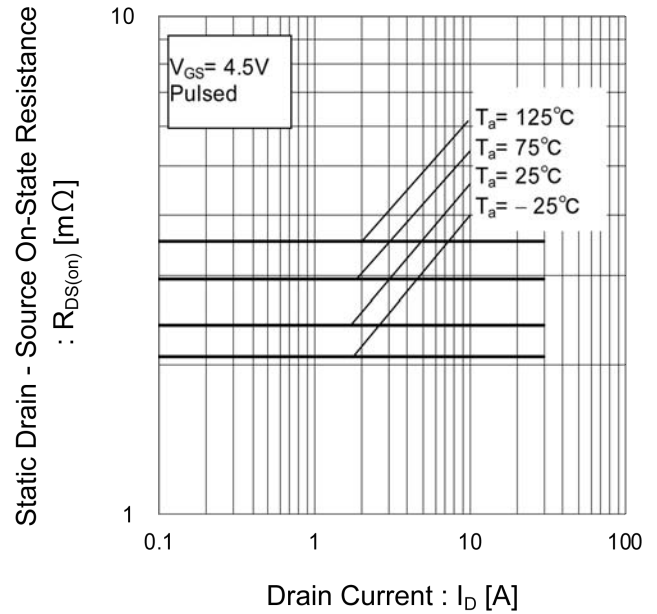
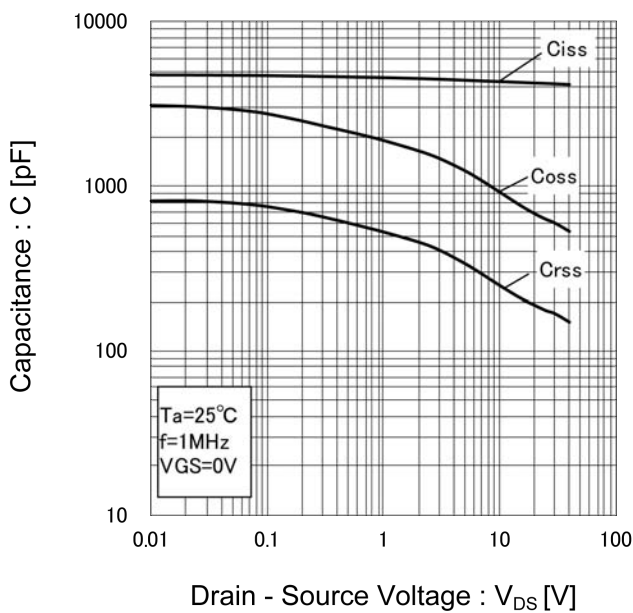


Fig.16 Typical Capacitance vs. Drain - Source Voltage



●Electrical characteristic curves

Fig.17 Switching Characteristics

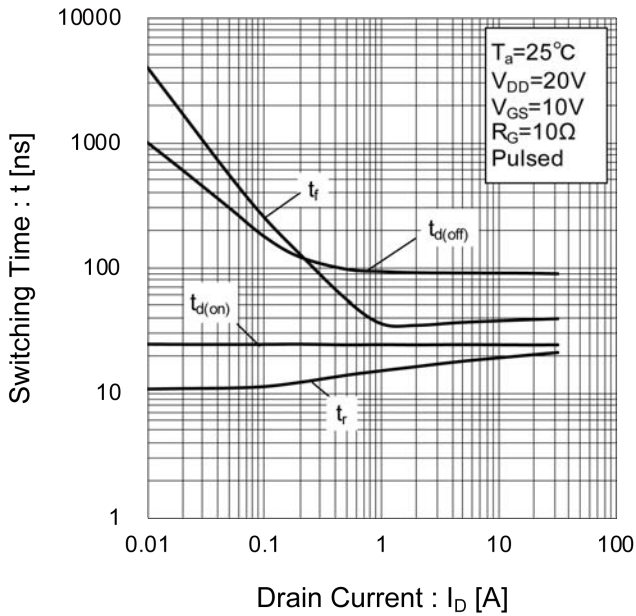


Fig.18 Dynamic Input Characteristics

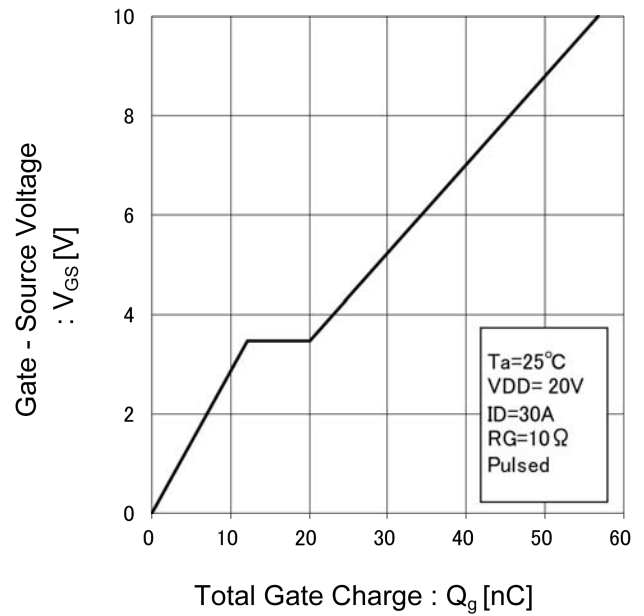
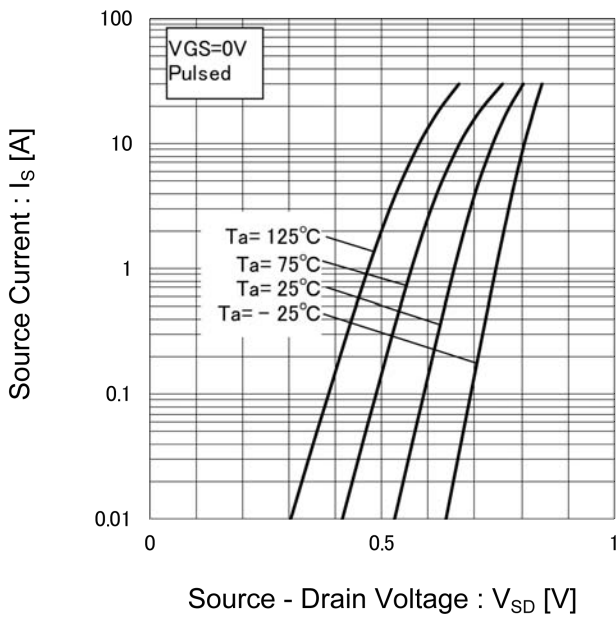


Fig.19 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

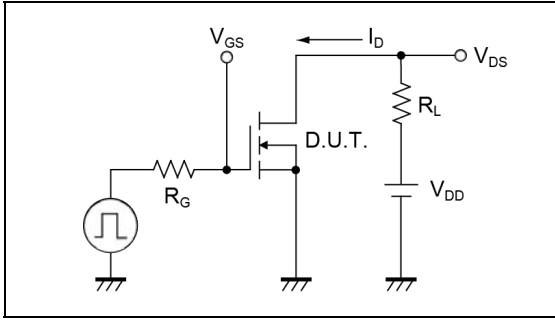


Fig.1-2 Switching Waveforms

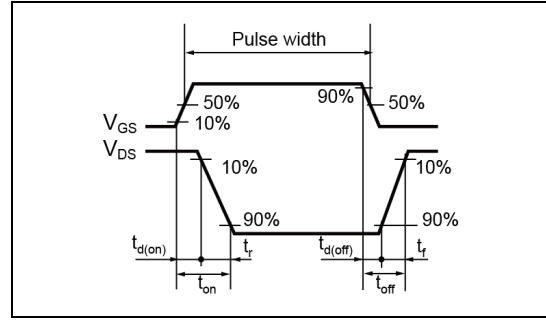


Fig.2-1 Gate Charge Measurement Circuit

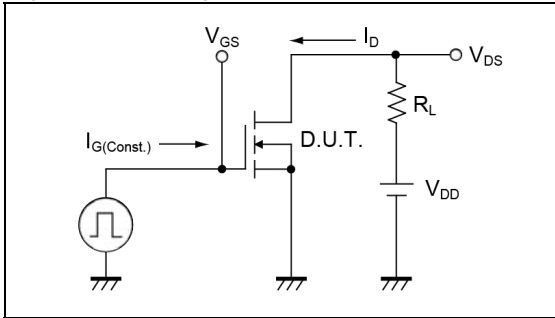


Fig.2-2 Gate Charge Waveform

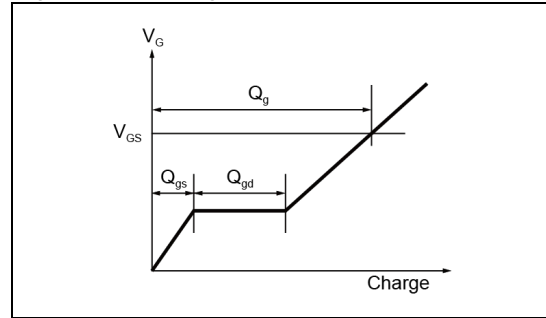


Fig.3-1 Avalanche Measurement Circuit

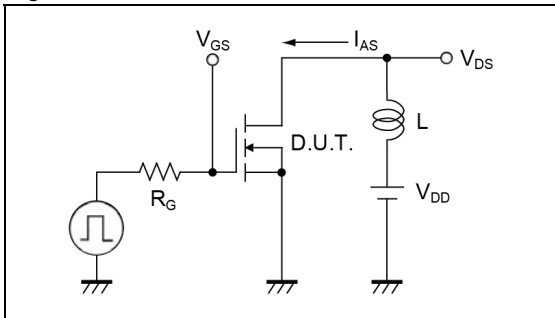
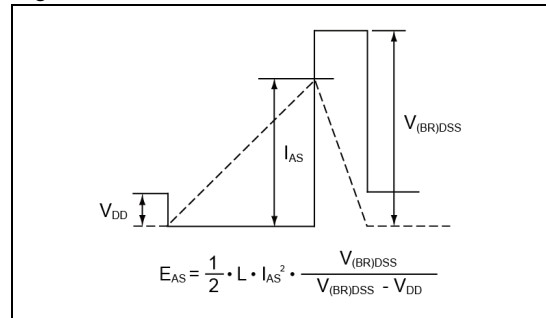
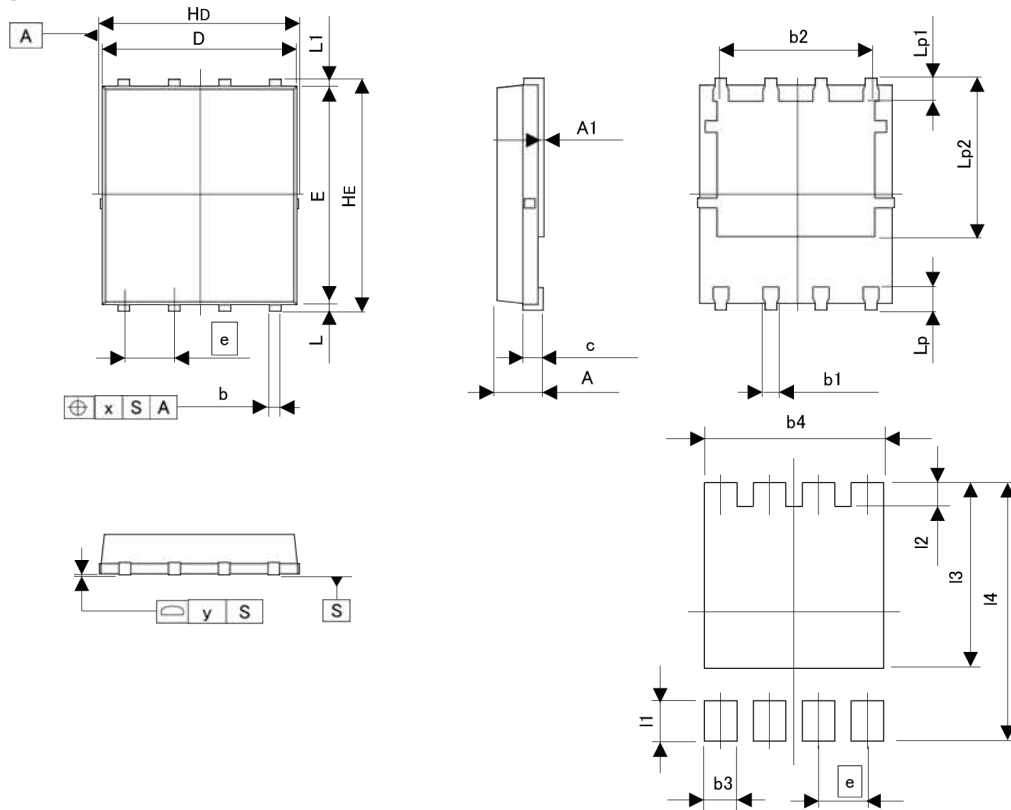


Fig.3-2 Avalanche Waveform



●Dimensions

HSOP8



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
A1	0.00	0.05	0.000	0.002
b	0.24	0.42	0.009	0.017
b1	0.29	0.49	0.011	0.019
b2	3.81	4.21	0.150	0.166
c	0.20	0.30	0.008	0.012
D	4.80	5.00	0.189	0.197
E	5.60	5.80	0.220	0.228
e	1.27		0.050	
Hd	4.90	5.10	0.193	0.201
HE	5.90	6.10	0.232	0.240
L	0.07	0.25	0.003	0.010
L1	0.07	0.25	0.003	0.010
Lp	0.50	0.70	0.020	0.028
Lp1	0.52	0.72	0.020	0.028
Lp2	3.92	4.32	0.154	0.170
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b3	-	0.59	-	0.023
b4	-	4.21	-	0.166
I1	-	0.80	-	0.031
I2	-	0.82	-	0.032
I3	-	4.32	-	0.170
I4	-	6.10	-	0.240

Dimension in mm/inches

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