

V_{DSS}	40V
$R_{DS(on)}$ at 10V (Max.)	7.0m Ω
$R_{DS(on)}$ at 4.5V (Max.)	9.2m Ω
I_D	18A
P_D	3.0W

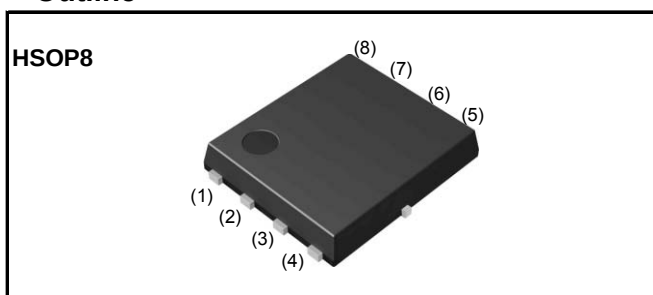
●Features

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

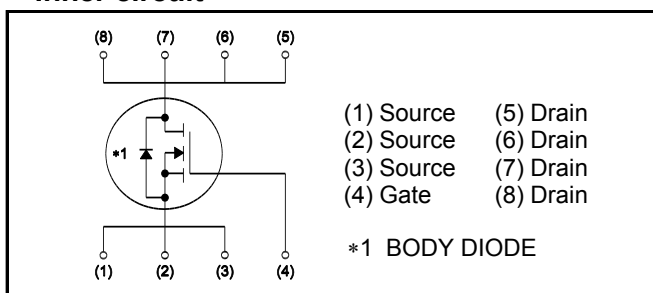
●Application

DC/DC converters

●Outline



●Inner circuit



●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2,500
	Taping code	TB
	Marking	RS1G180MN

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

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	40	V
Continuous drain current	I_D^{*1}	± 18	A
Pulsed drain current	$I_{D,pulse}^{*2}$	± 72	A
Gate - Source voltage	V_{GSS}	± 20	V
Power dissipation	P_D^{*3}	3.0	W
Junction temperature	T_j	150	$^\circ\text{C}$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}^{*4}	-	-	41.7	°C/W
	R_{thJC}	-	-	-	°C/W

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

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	-	35	-	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	$V_{GS(th)}$	$V_{DS} = 10V, I_D = 1mA$	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	-	-3.7	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 10V, I_D = 18A$	-	5.0	7.0	mΩ
		$V_{GS} = 4.5V, I_D = 18A$	-	6.7	9.2	
Gate input resistance	R_G	$f = 1MHz, \text{open drain}$	-	4.1	-	Ω
Transconductance	g_{fs}^{*4}	$V_{DS} = 10V, I_D = 18A$	11.0	-	-	S

*1 Limited only by maximum temperature allowed.

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

*3 Mounted on a FR4 (40×40×0.8mm)

*4 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	1293	-	pF
Output capacitance	C_{oss}	$V_{DS} = 20V$	-	307	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	58	-	
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} \approx 20V, V_{GS} = 10V$	-	14.1	-	ns
Rise time	t_r^{*4}	$I_D = 9.0A$	-	8.9	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L = 2.2\Omega$	-	48.0	-	
Fall time	t_f^{*4}	$R_G = 10\Omega$	-	8.4	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*4}	$V_{DD} \approx 20V, I_D = 18A$ $V_{GS} = 10V$	-	19.5	-	nC
		$V_{DD} \approx 20V, I_D = 18A$ $V_{GS} = 4.5V$	-	9.5	-	
Gate - Source charge	Q_{gs}^{*4}	$V_{GS} = 4.5V$	-	3.2	-	
Gate - Drain charge	Q_{gd}^{*4}		-	2.5	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S^{*1}	$T_a = 25^\circ\text{C}$	-	-	2.5	A
Forward voltage	V_{SD}^{*4}	$V_{GS} = 0V, I_S = 2.5A$	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

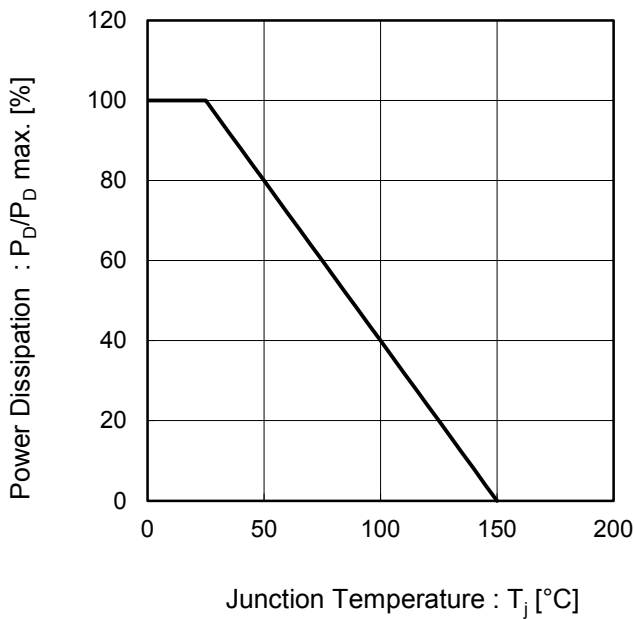


Fig.2 Maximum Safe Operating Area

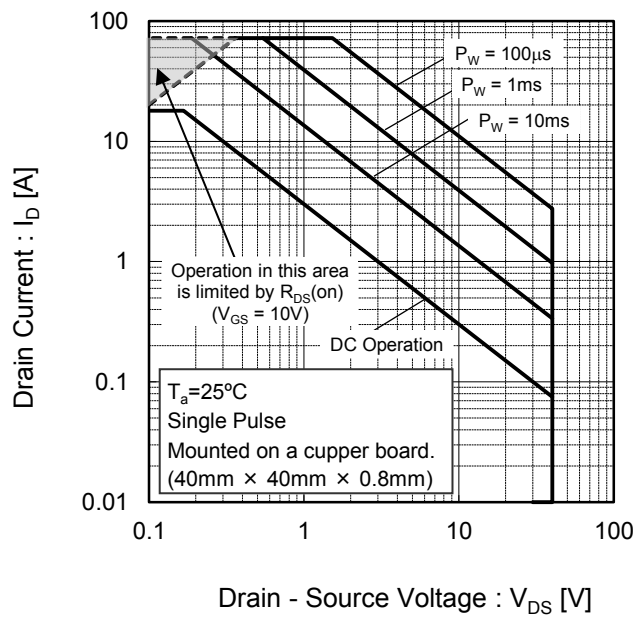


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

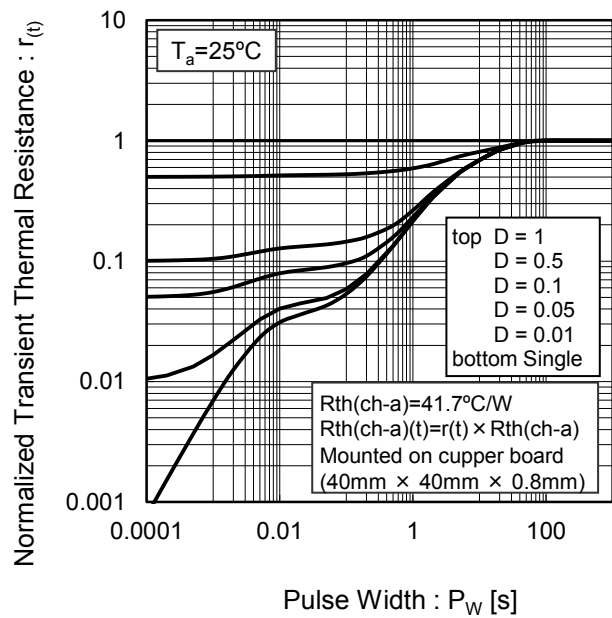
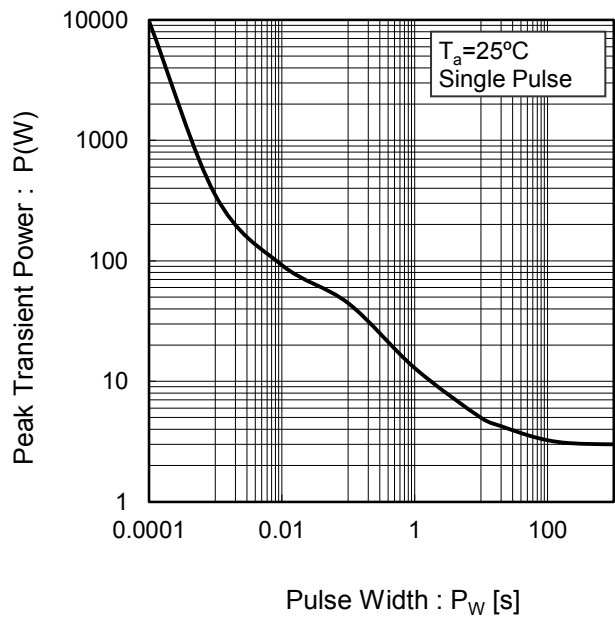


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

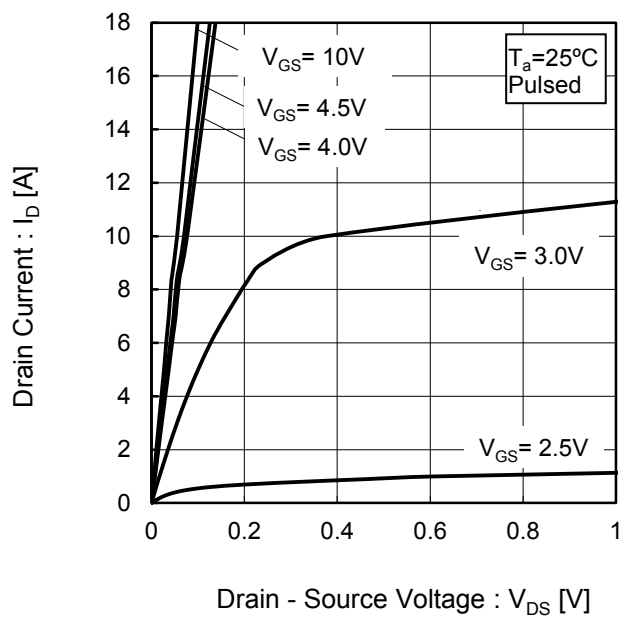


Fig.6 Typical Output Characteristics(II)

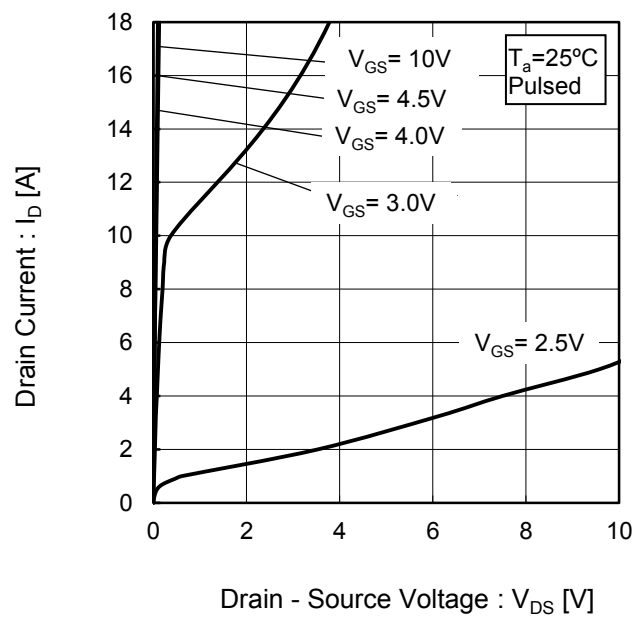


Fig.7 Breakdown Voltage
vs. Junction Temperature

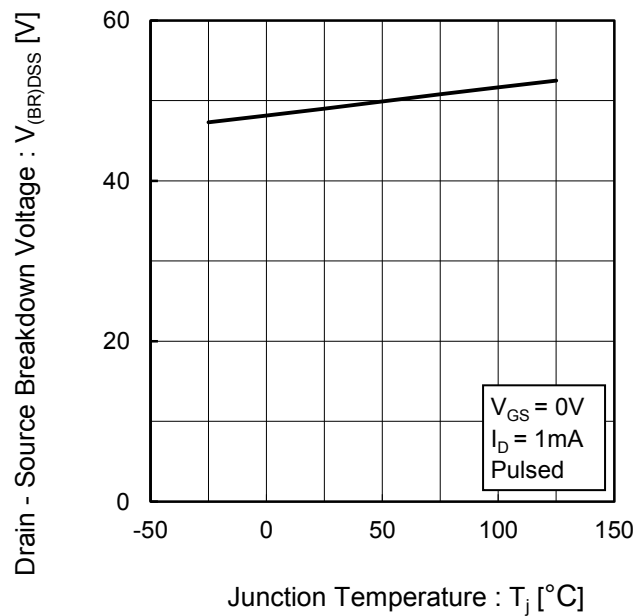
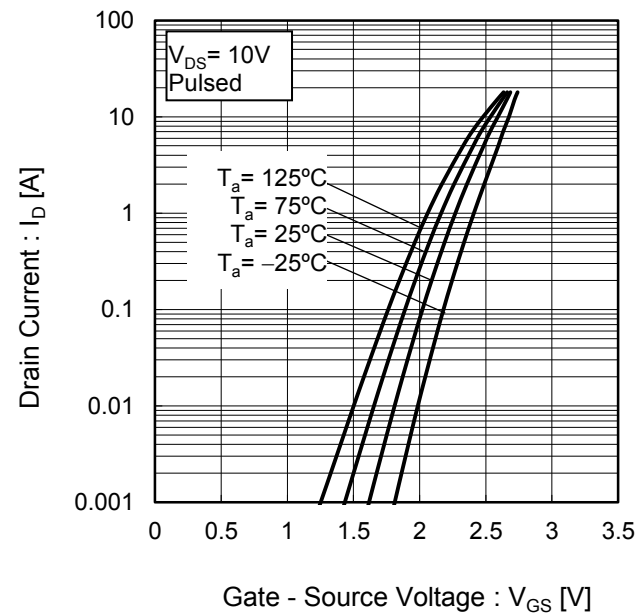


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage
vs. Junction Temperature

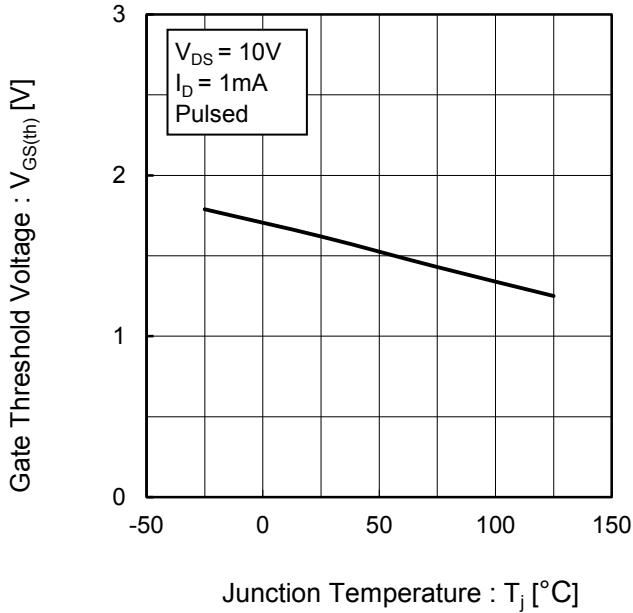


Fig.10 Forward Transfer Admittance
vs. Drain Current

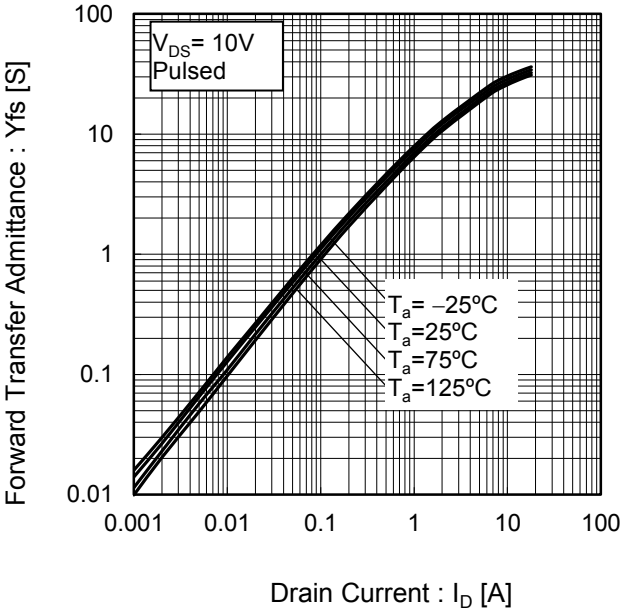


Fig.11 Drain CurrentDerating Curve

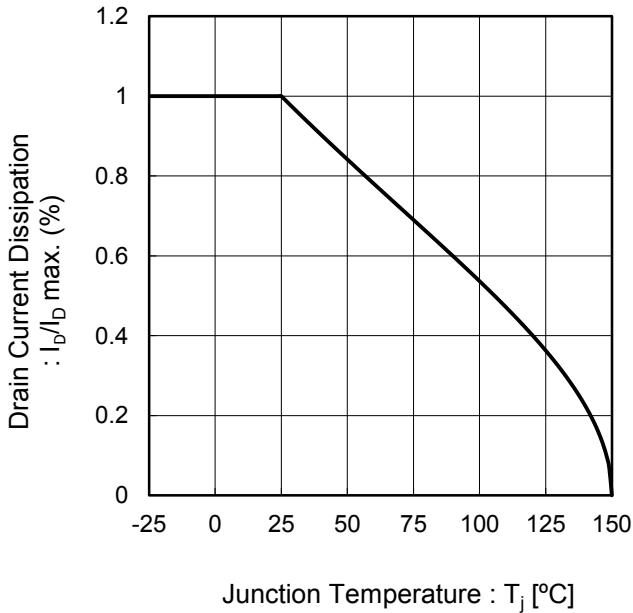
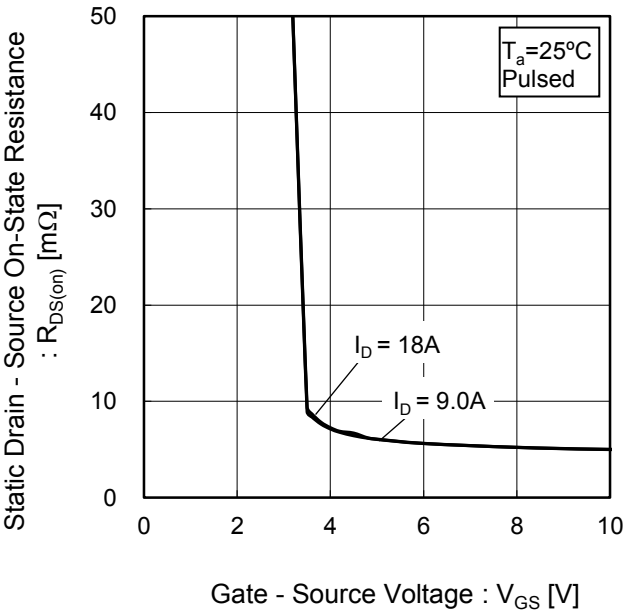


Fig.12 Static Drain - Source On - State
Resistance vs. Gate Source Voltage



●Electrical characteristic curves

Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(I)

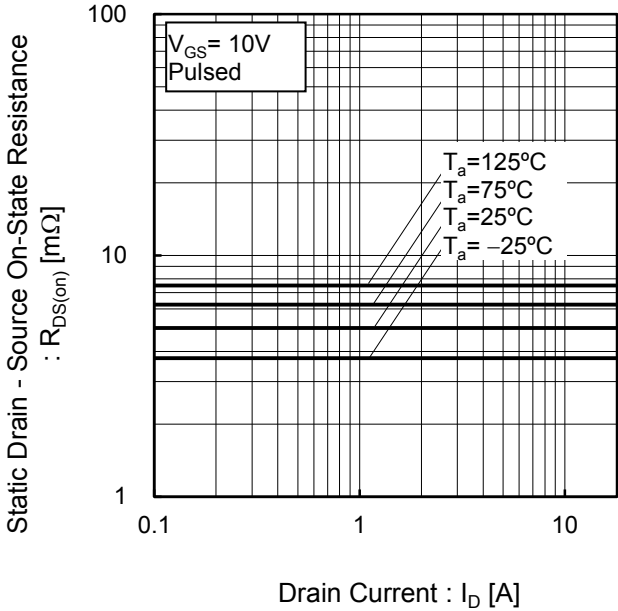


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature

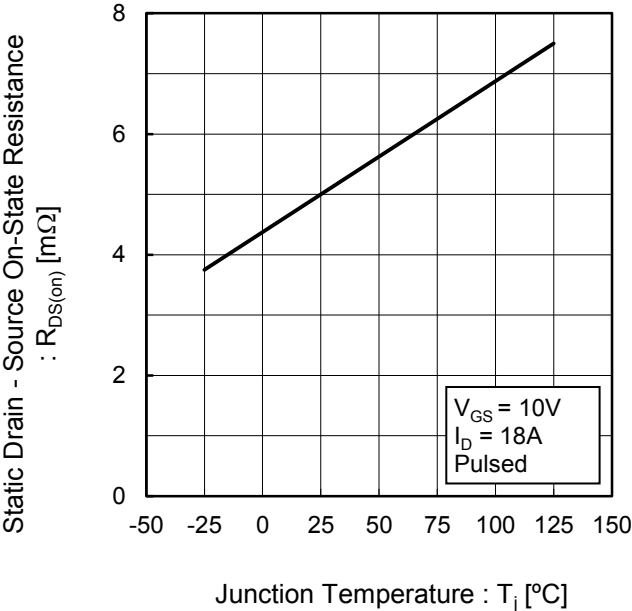
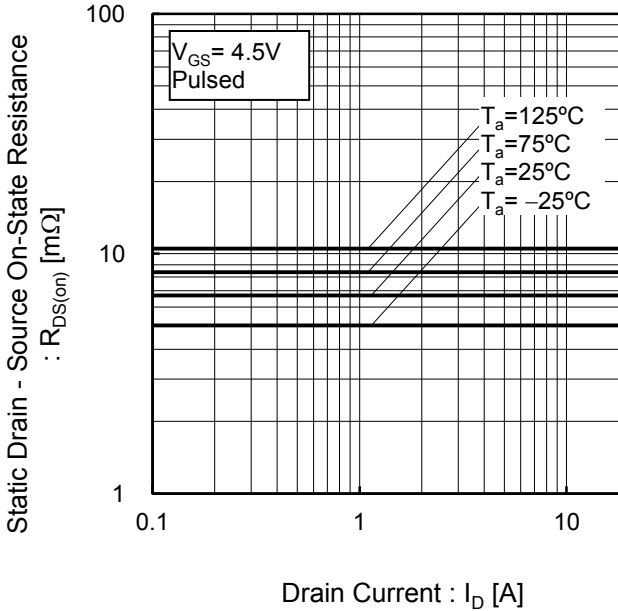


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

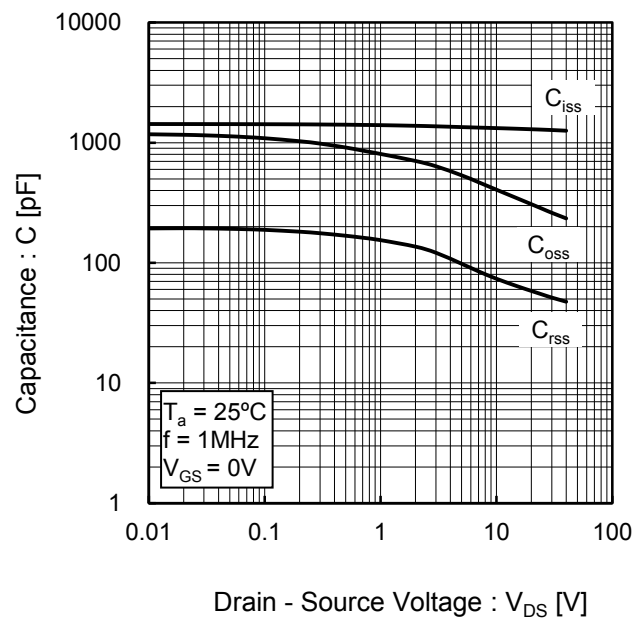


Fig.17 Switching Characteristics

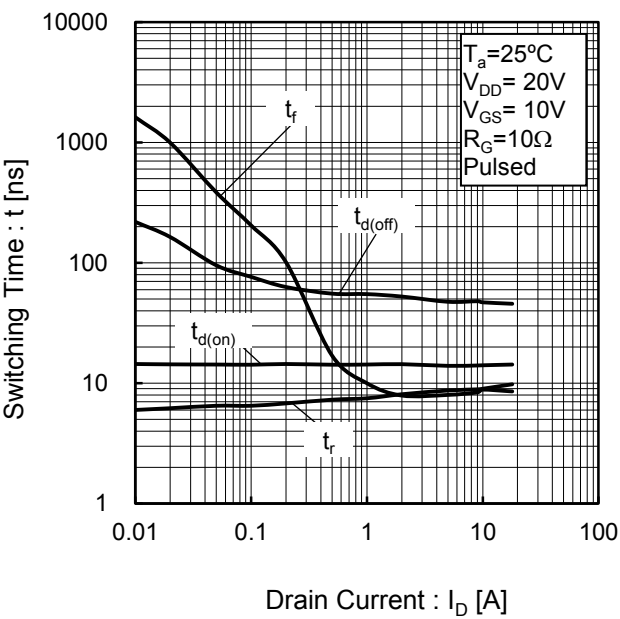


Fig.18 Dynamic Input Characteristics

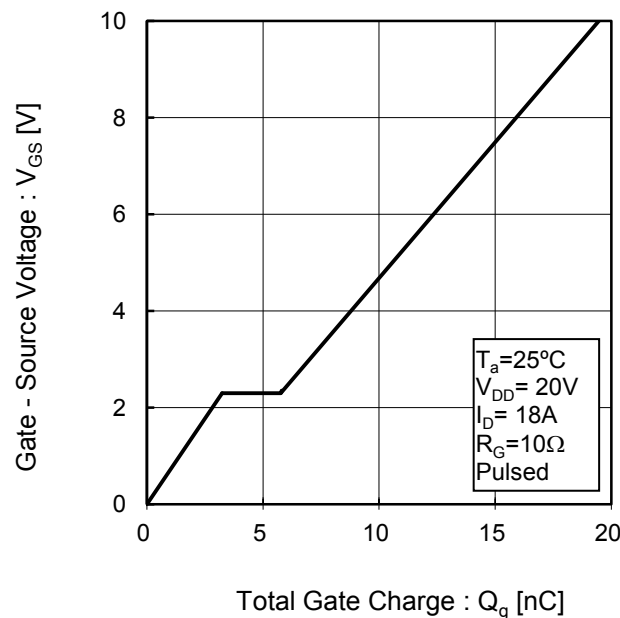
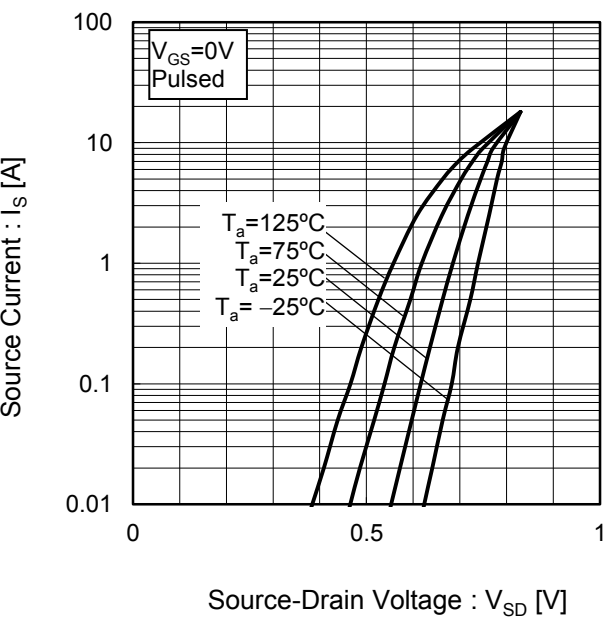


Fig.19 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

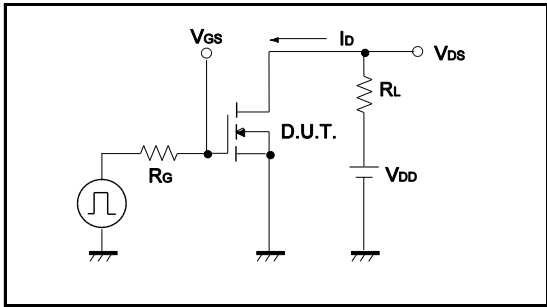


Fig.1-2 Switching Waveforms

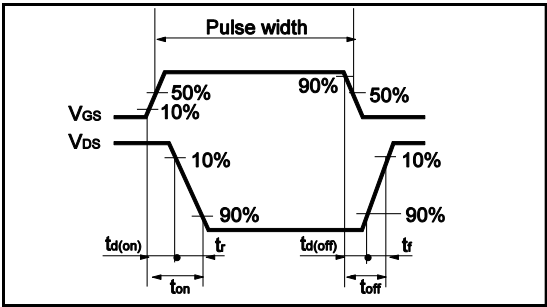


Fig.2-1 Gate Charge Measurement Circuit

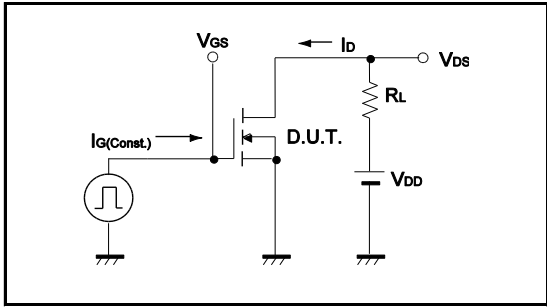
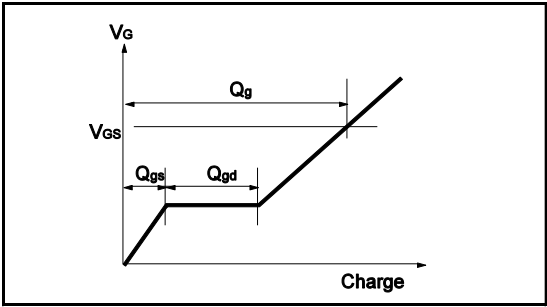
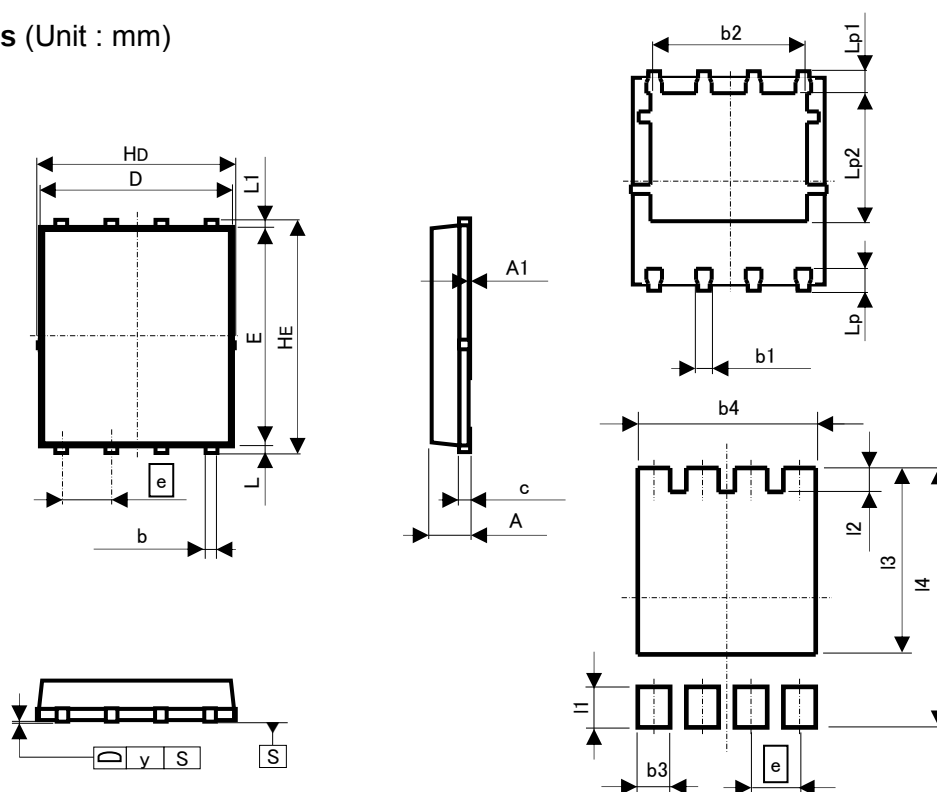


Fig.2-2 Gate Charge Waveform



●Dimensions (Unit : mm)

HSOP8



Pattern of terminal position areas

DIM	MILIMETERS		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	3.30	3.70	0.130	0.146
y	-	0.10	0.004	

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b3	-	0.75	-	0.030
b4	-	4.56	-	0.180
l1	-	1.10	-	0.043
l2	-	0.80	-	0.031
l3	-	4.59	-	0.181
l4	-	6.60	-	0.260

Dimension in mm/inches

Notes

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