RS1G120MN

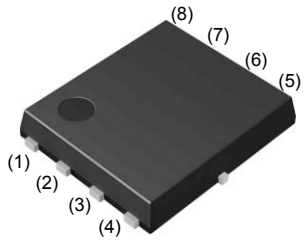
Nch 40V 12A Power MOSFET

Datasheet

V_{DSS}	40V
$R_{DS(on)}$ at 10V (Max.)	16.2mΩ
$R_{DS(on)}$ at 4.5V (Max.)	20.7mΩ
I_D	12A
P_D	3.0W

●Outline

HSOP8



●Features

1) Low on - resistance.

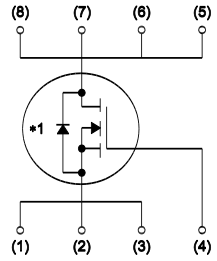
2) High Power Small Mold Package (HSOP8).

3) Pb-free lead plating ; RoHS compliant

4) Halogen Free

5) 100% Rg and UIS Tested

●Inner circuit



(1) Source (5) Drain
(2) Source (6) Drain
(3) Source (7) Drain
(4) Gate (8) Drain

*1 BODY DIODE

●Application

DC/DC converters

●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2,500
	Taping code	TB
	Marking	RS1G120MN

●Absolute maximum ratings(T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	40	V
Continuous drain current	I_D *1	±12	A
Pulsed drain current	$I_{D,pulse}$ *2	±48	A
Gate - Source voltage	V_{GSS}	±20	V
Power dissipation	P_D *3	3.0	W
Junction temperature	T_j	150	°C
Range of storage temperature	T_{stg}	−55 to +150	°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°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	-	50	-	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} = ±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	-	−5.3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS}=10V, I_D=12A	-	11.6	16.2	mΩ
		V_{GS}=4.5V, I_D=12A	-	15.6	20.7	
Gate input resistannce	R_G	f = 1MHz, open drain	-	3.4	-	Ω
Transconductance	g_{fs} *4	V_{DS}=10V, I_D=12A	6.0	-	-	S

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 Mounted on a FR4 (40×40×0.8mm)

*4 Pulsed

●**Electrical characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	570	-	pF
Output capacitance	C_{oss}	V_{DS} = 20V	-	134	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	32	-	
Turn - on delay time	$t_{d(on)}$ *4	$V_{DD} \simeq$ 20V, V_{GS} = 10V	-	9.7	-	ns
Rise time	t_r *4	I_D = 6.0A	-	4.3	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 3.3Ω	-	23.8	-	
Fall time	t_f *4	R_G = 10Ω	-	3.2	-	

●**Gate Charge characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	$V_{DD} \simeq$ 20V, I_D=12A V_{GS} = 10V	-	9.4	-	nC
		$V_{DD} \simeq$ 20V, I_D=12A V_{GS} = 4.5V	-	4.4	-	
Gate - Source charge	Q_{gs} *4		-	2.4	-	
Gate - Drain charge	Q_{gd} *4		-	1.1	-	

●**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

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

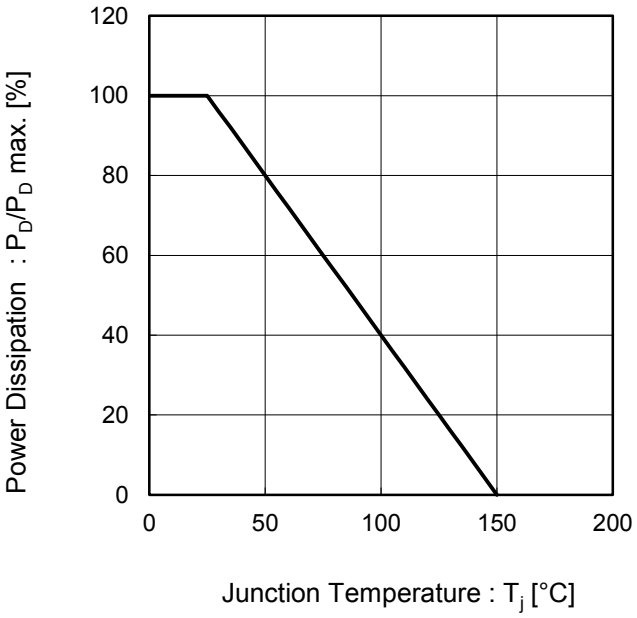


Fig.2 Maximum Safe Operating Area

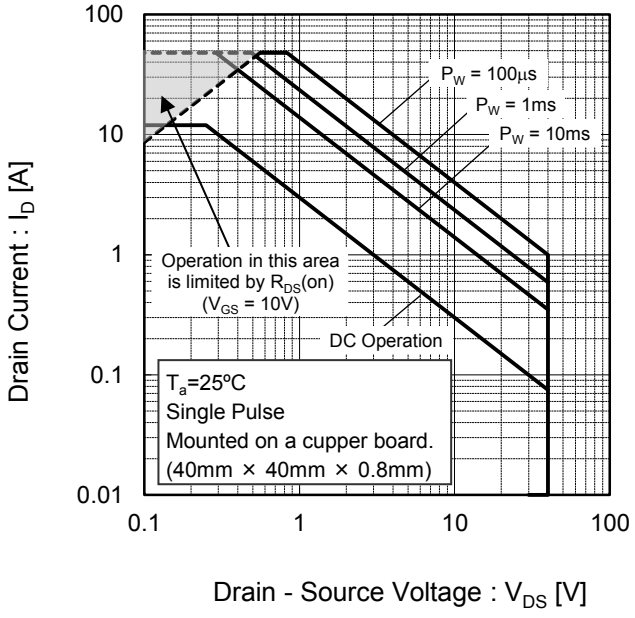


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

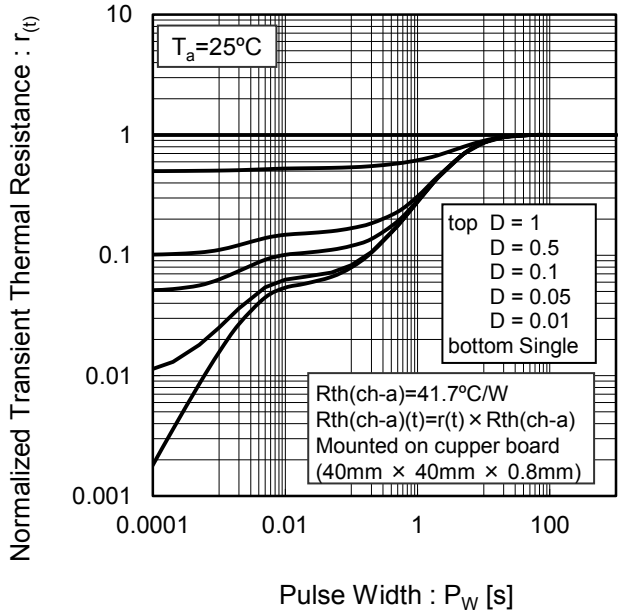
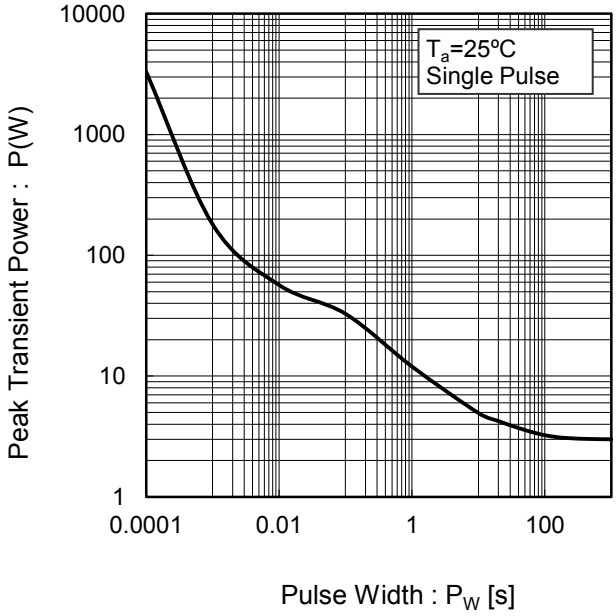


Fig.4 Single Pulse Maxmum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

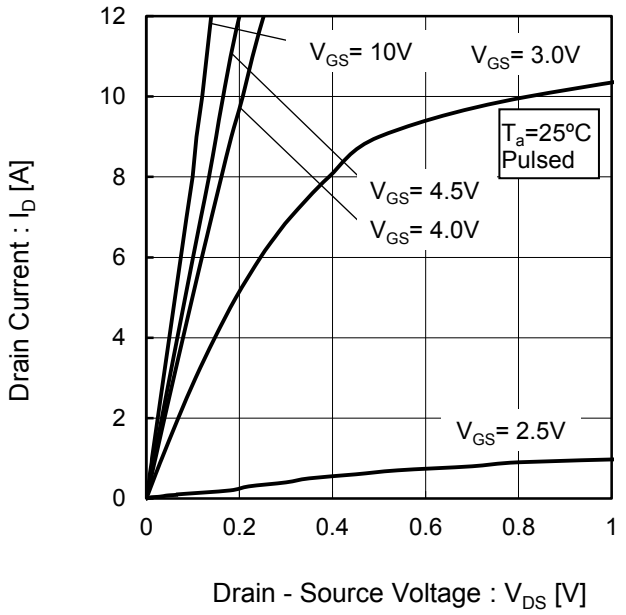


Fig.6 Typical Output Characteristics(II)

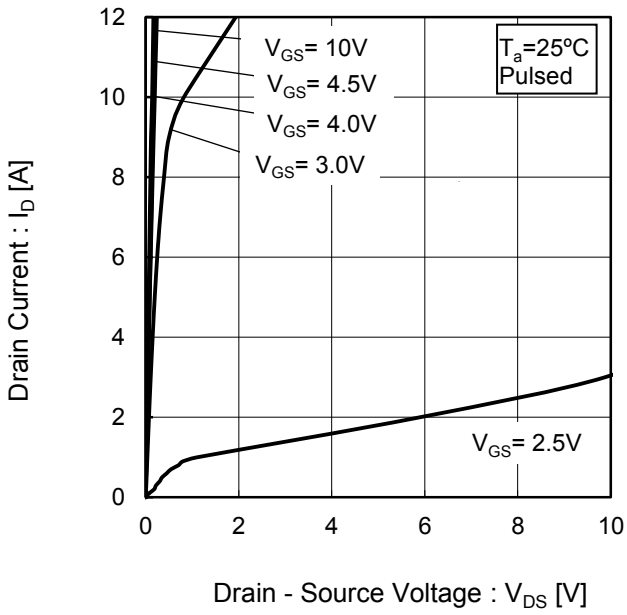


Fig.7 Breakdown Voltage vs. Junction Temperature

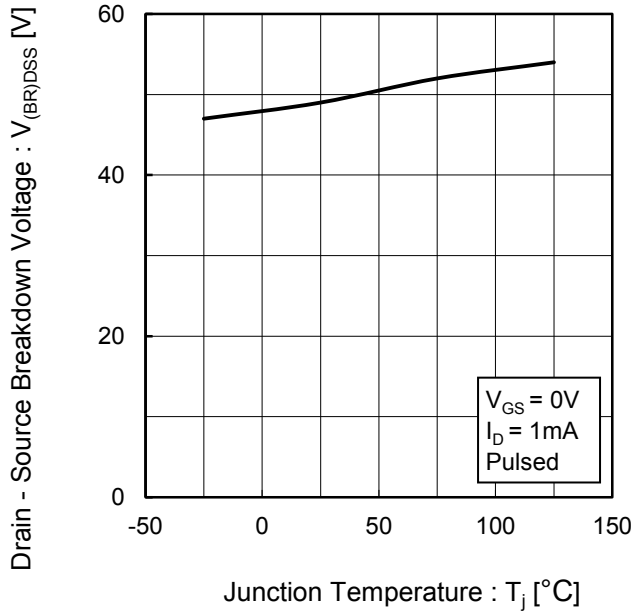
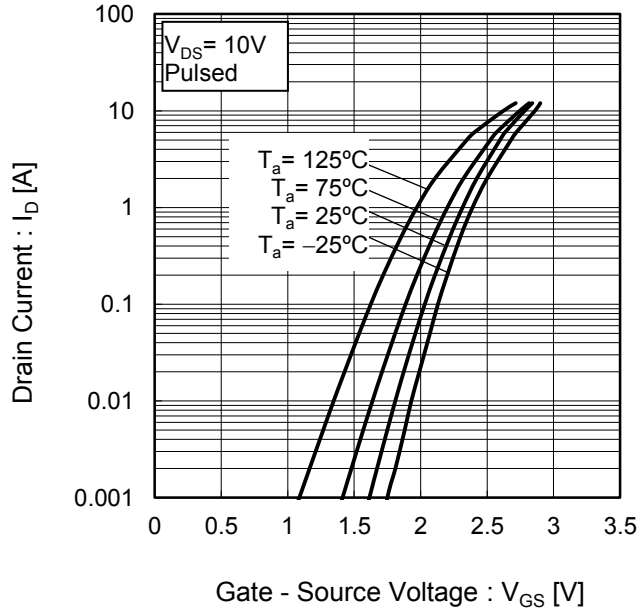


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

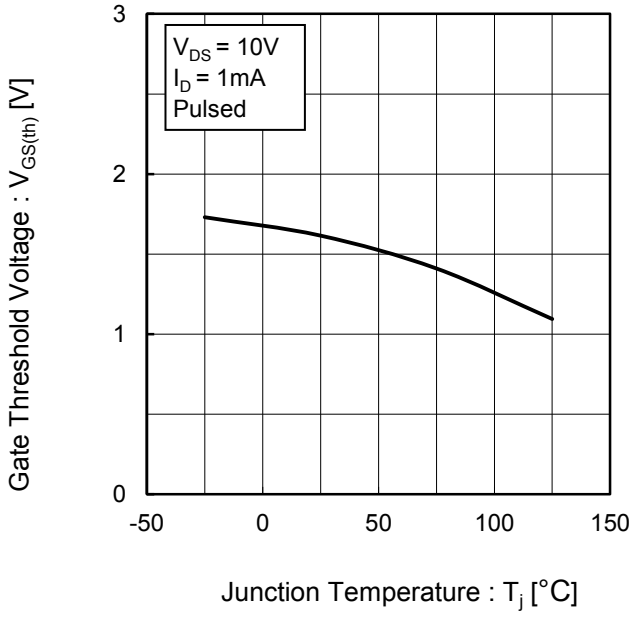


Fig.10 Forward Transfer Admittance vs. Drain Current

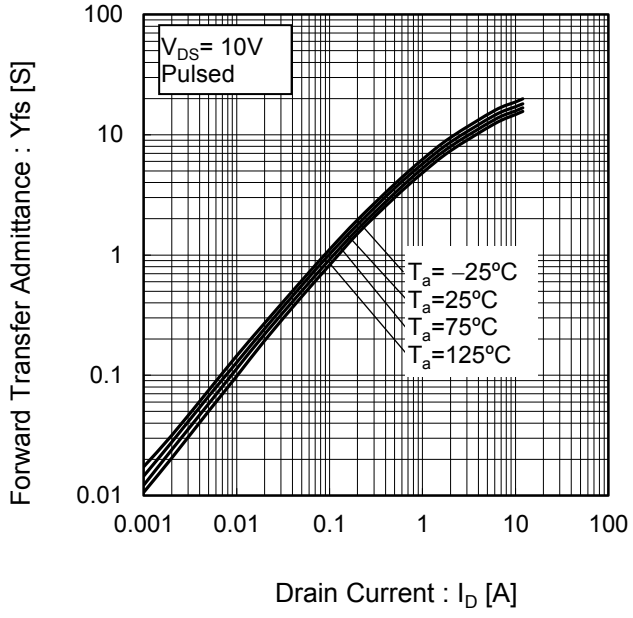


Fig.11 Drain CurrentDerating Curve

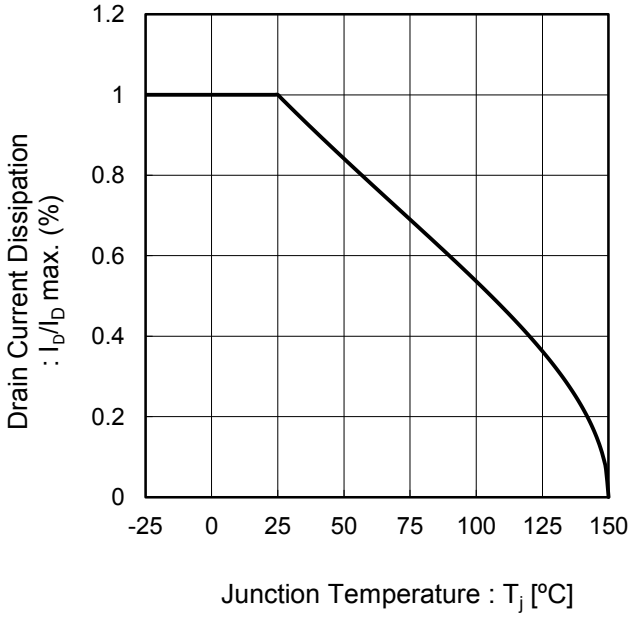
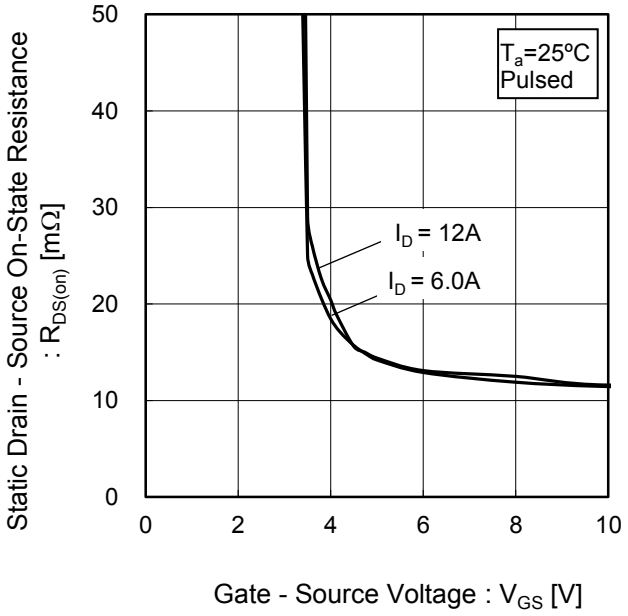


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

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

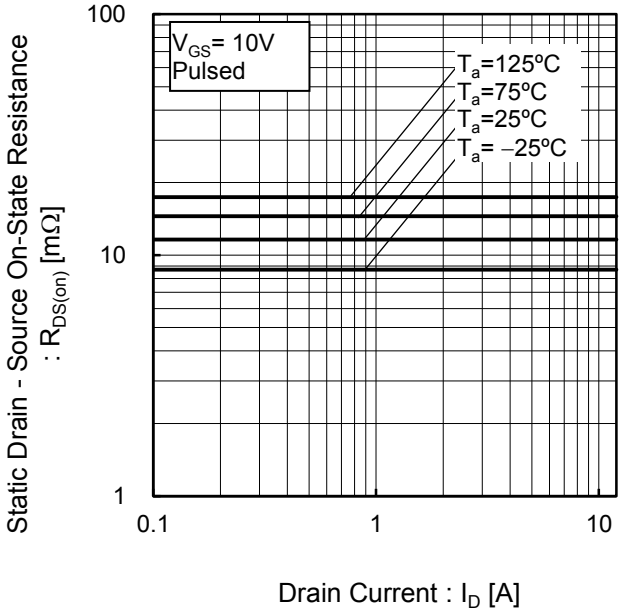


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature

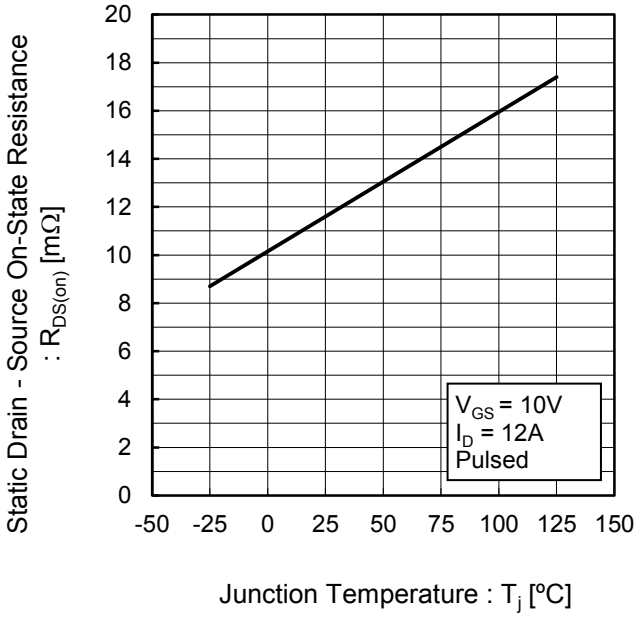
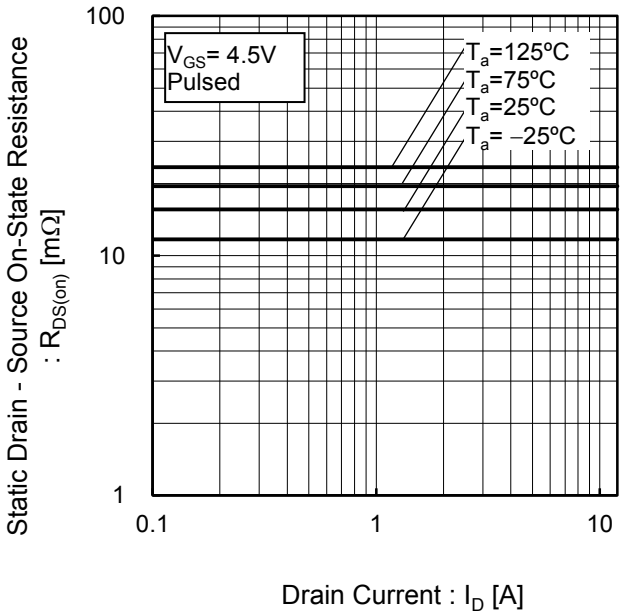


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

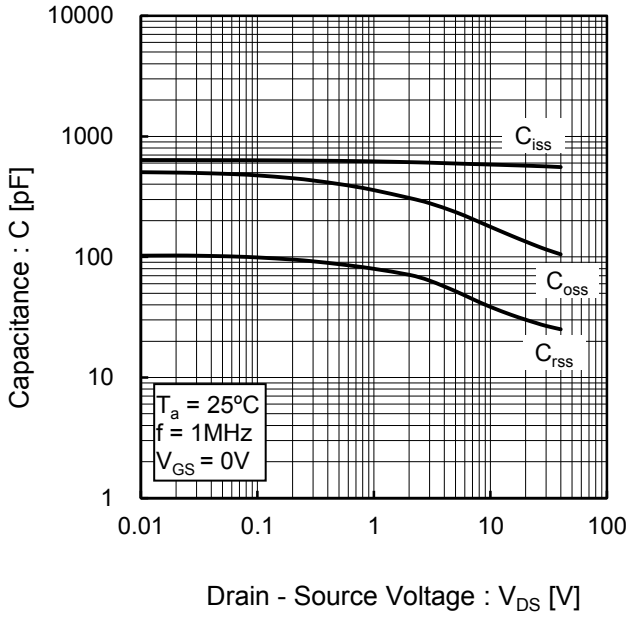


Fig.17 Switching Characteristics

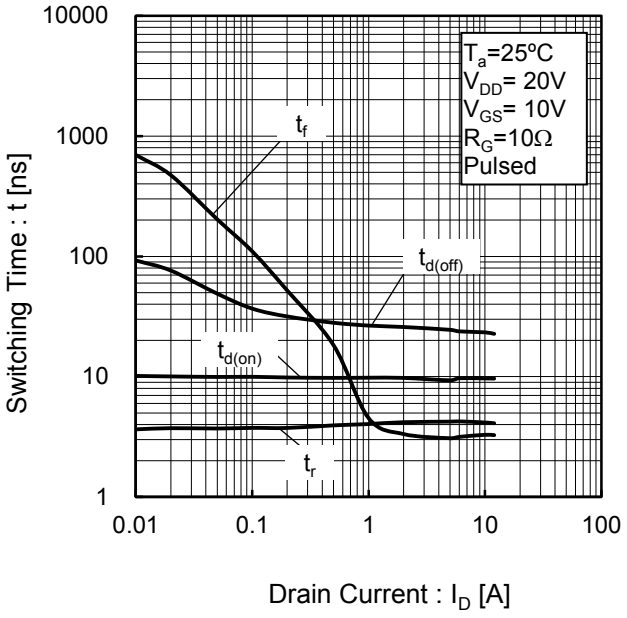


Fig.18 Dynamic Input Characteristics

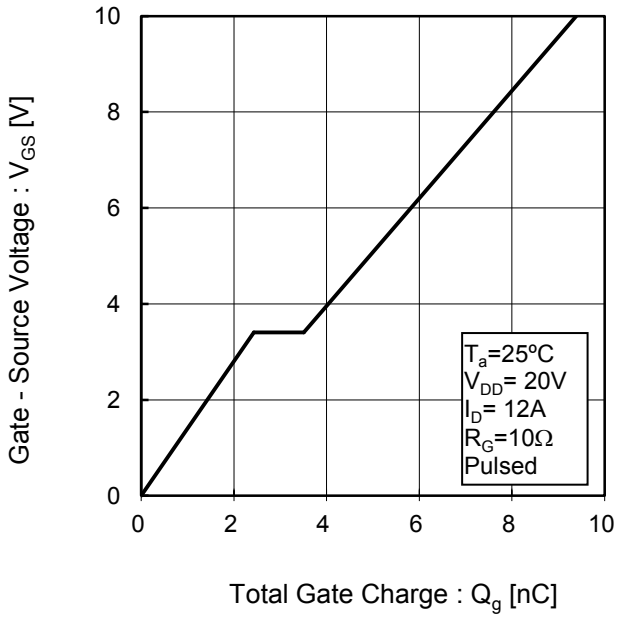
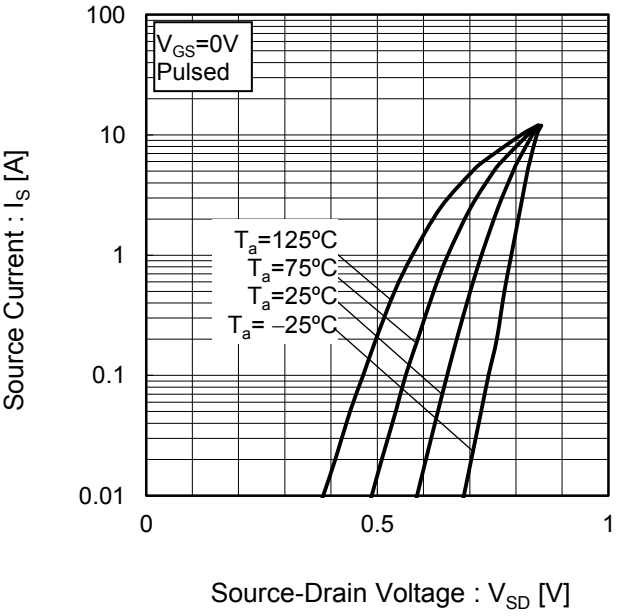


Fig.19 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

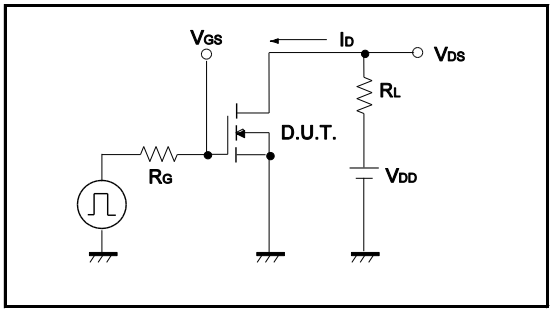


Fig.1-2 Switching Waveforms

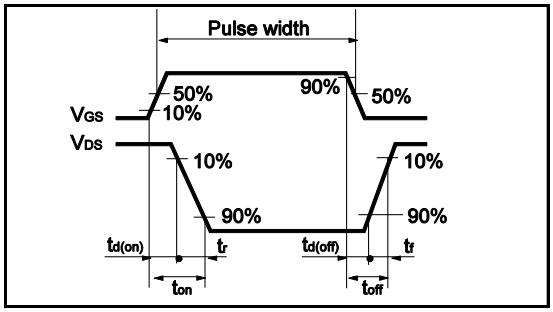


Fig.2-1 Gate Charge Measurement Circuit

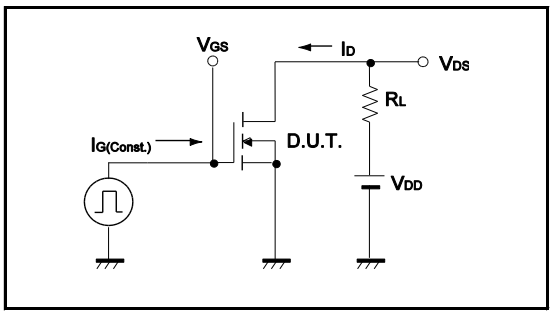
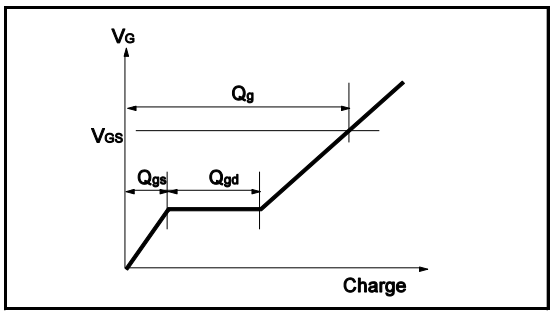
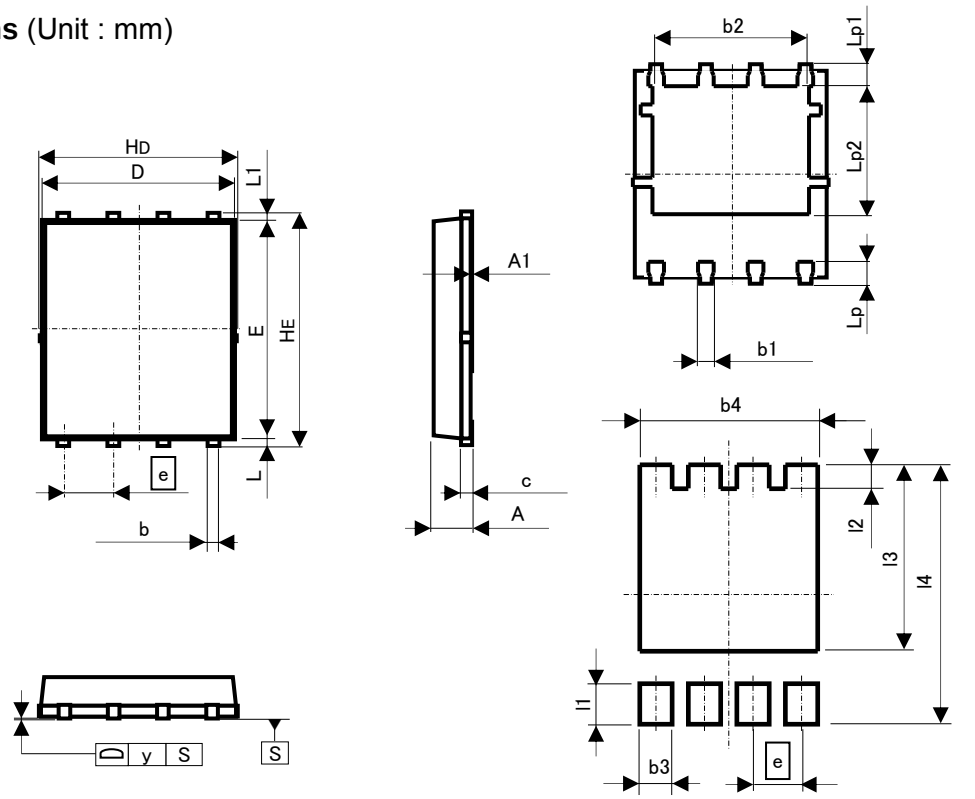


Fig.2-2 Gate Charge Waveform



●**Dimensions** (Unit : mm)

HSOP8



Patterm 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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