

$V_{DSS}$	30V
$R_{DS(on)}(Max.)$	3.2m $\Omega$
$I_D$	$\pm 24A$
$P_D$	3W

### ●Features

- 1) Low on - resistance.
- 2) High Power small mold Package (HSOP8).
- 3) Pb-free lead plating ; RoHS compliant.
- 4) Halogen Free.

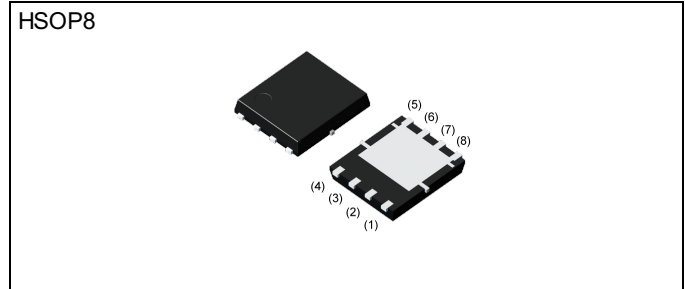
### ●Application

Switching

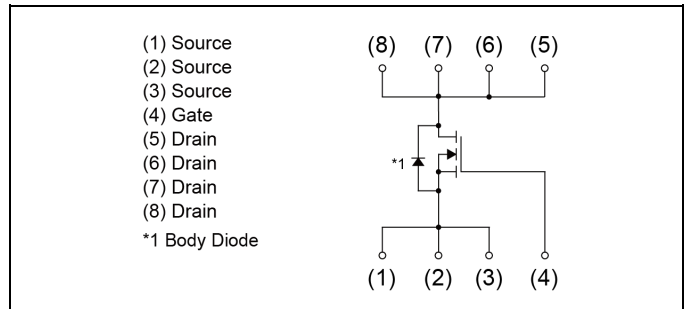
### ●Absolute maximum ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	30	V
Continuous drain current	$I_D$	$\pm 24$	A
Pulsed drain current	$I_{D,pulse}^{*1}$	$\pm 96$	A
Gate - Source voltage	$V_{GSS}$	$\pm 20$	V
Power dissipation	$P_D^{*2}$	3	W
	$P_D^{*3}$	30	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	RS1E240BN

### ● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	$R_{thJA}^{*2}$	-	41.7	-	°C/W
Thermal resistance, junction - case	$R_{thJC}^{*3}$	-	4.17	-	°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 $25^\circ\text{C}$	-	21	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	$\mu\text{A}$
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	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 $25^\circ\text{C}$	-	-3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 10V, I_D = 24A$	-	2.3	3.2	m $\Omega$
		$V_{GS} = 4.5V, I_D = 24A$	-	3.3	4.6	
Transconductance	$g_{fs}^{*4}$	$V_{DS} = 5V, I_D = 24A$	18	-	-	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

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$V_{GS} = 0V$	-	3900	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = 15V$	-	450	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	350	-	
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} \approx 15V, V_{GS} = 10V$	-	25	-	ns
Rise time	$t_r^{*4}$	$I_D = 12A$	-	70	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L = 1.25\Omega$	-	115	-	
Fall time	$t_f^{*4}$	$R_G = 10\Omega$	-	26	-	

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

Parameter	Symbol	Conditions	Values			Unit	
			Min.	Typ.	Max.		
Total gate charge	$Q_g^{*4}$	$V_{DD} \approx 15V$ $I_D = 24A$	$V_{GS} = 10V$	-	70	-	nC
Gate - Source charge	$Q_{gs}^{*4}$		$V_{GS} = 4.5V$	-	35	-	
Gate - Drain charge	$Q_{gd}^{*4}$		$V_{GS} = 4.5V$	-	10	-	
				-	14	-	

**● 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	$I_S$	$T_a = 25^\circ\text{C}$	-	-	2.5	A
Body diode pulse current	$I_{SP}^{*1}$		-	-	96	
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

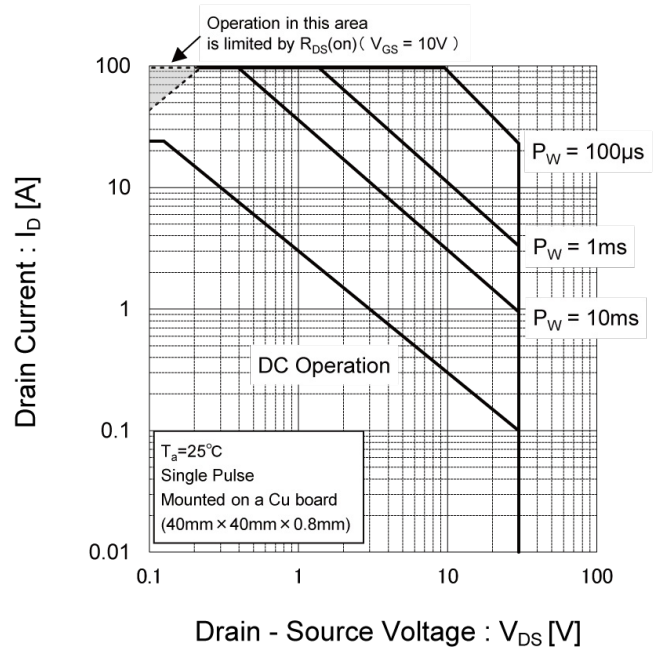


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

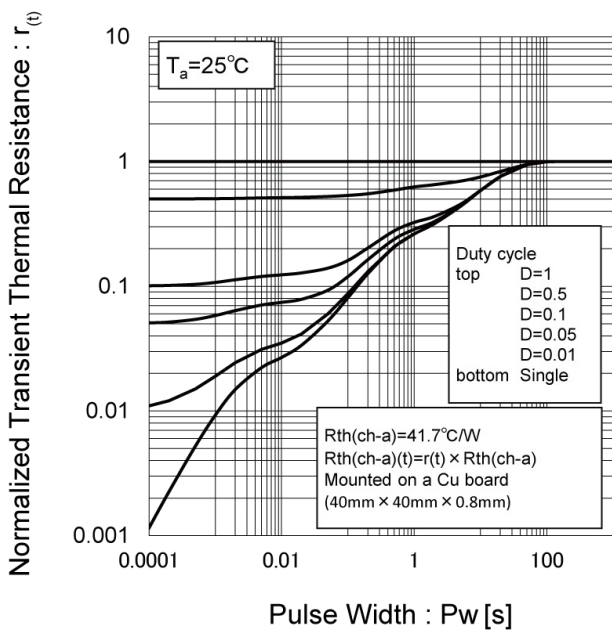
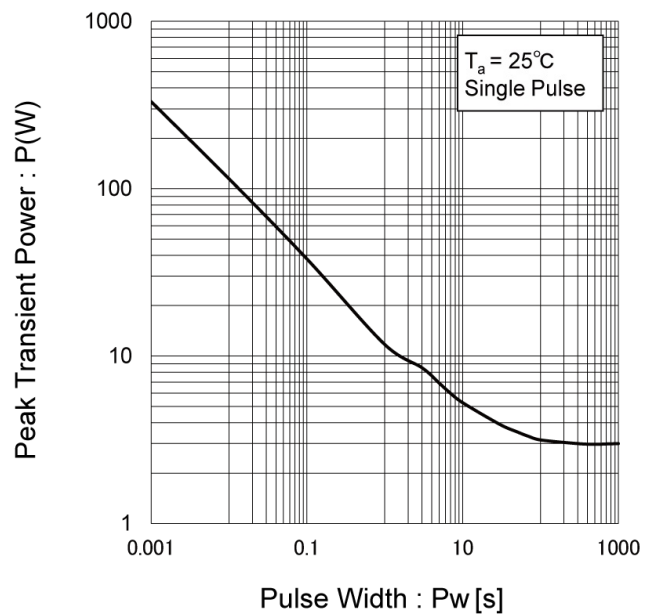


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

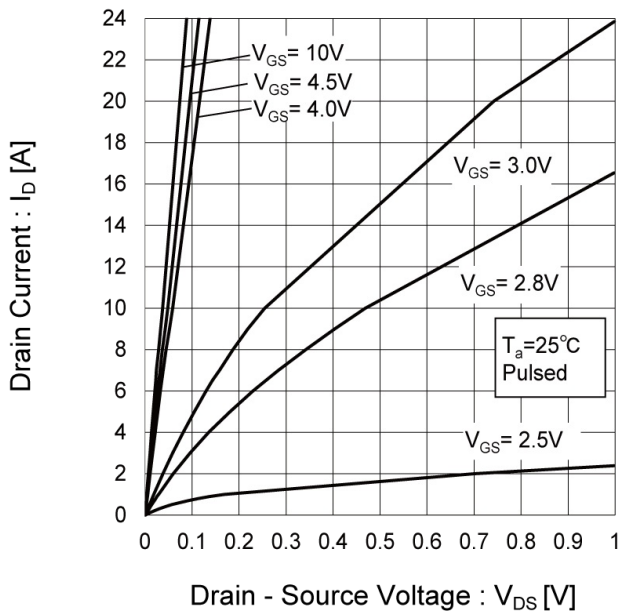


Fig.6 Typical Output Characteristics(II)

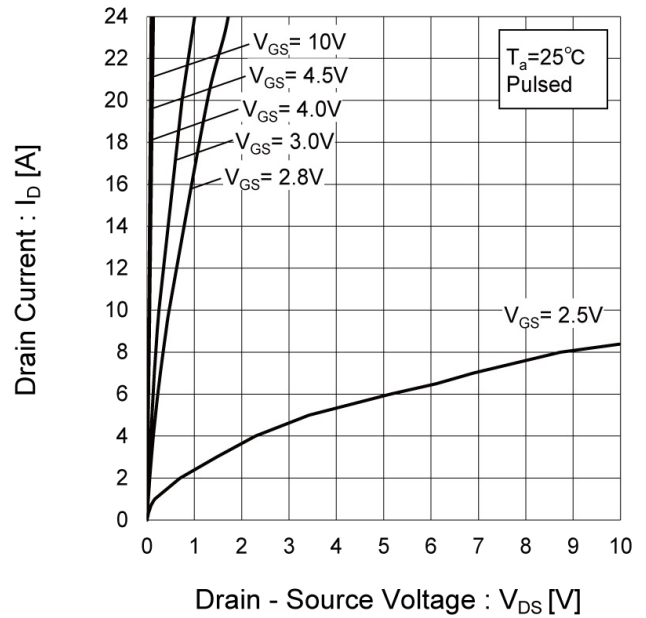
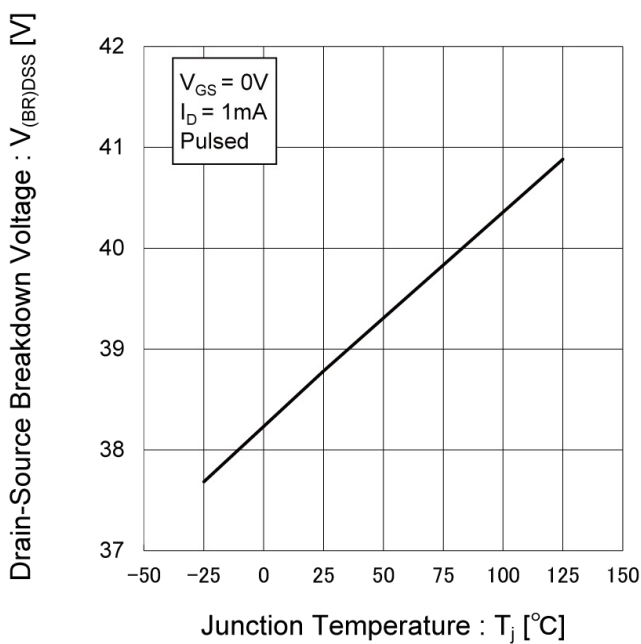


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

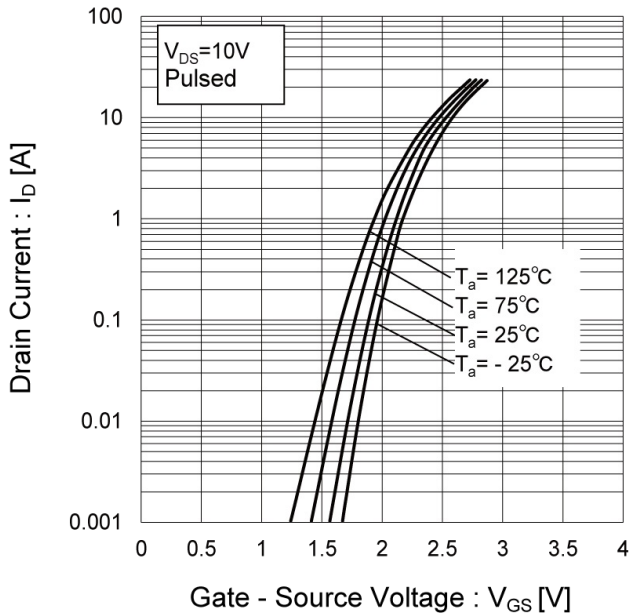


Fig.9 Gate Threshold Voltage vs. Junction Temperature

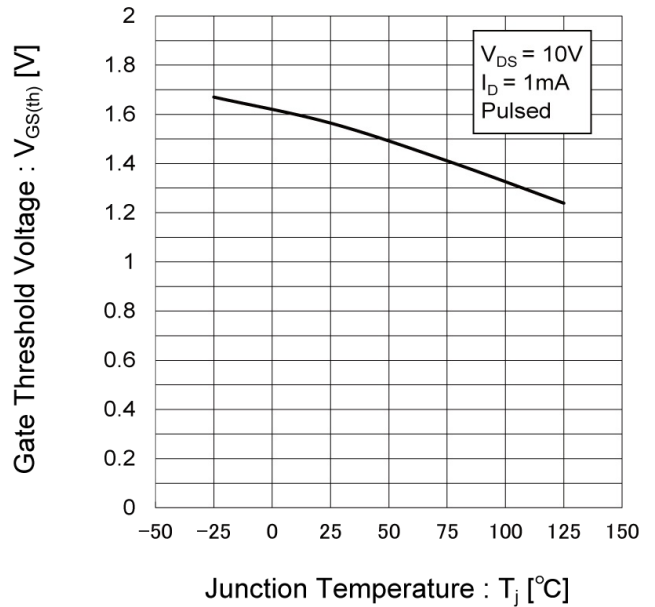
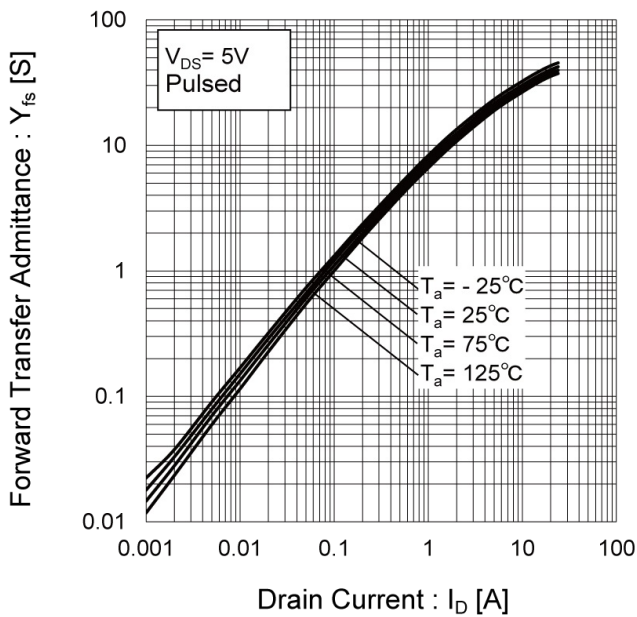


Fig.10 Transconductance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve



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

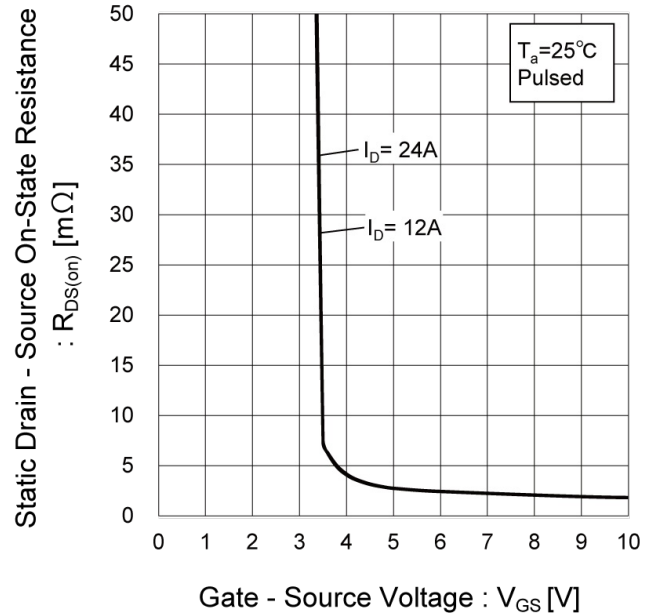
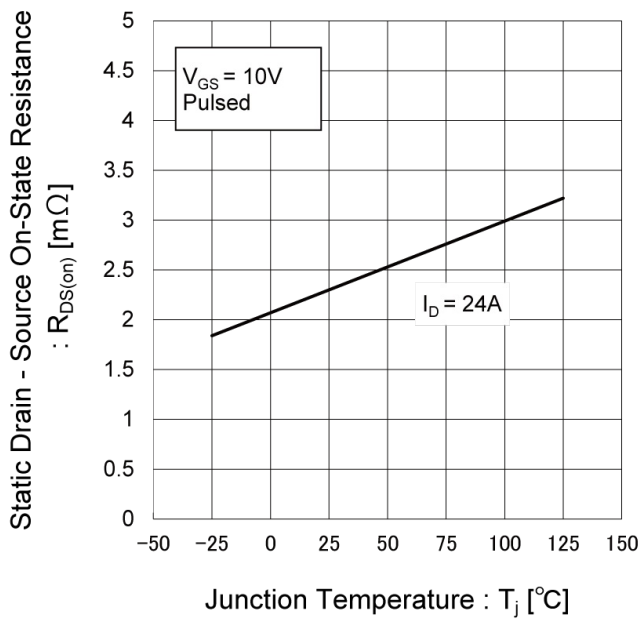


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

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

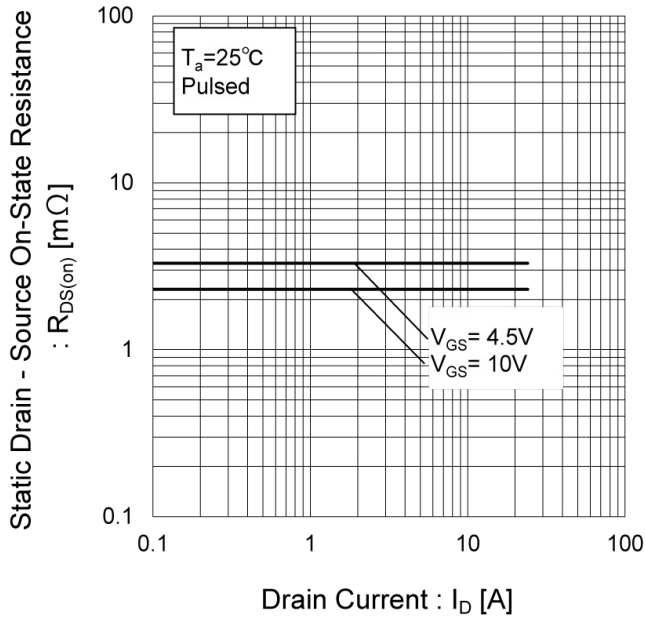


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

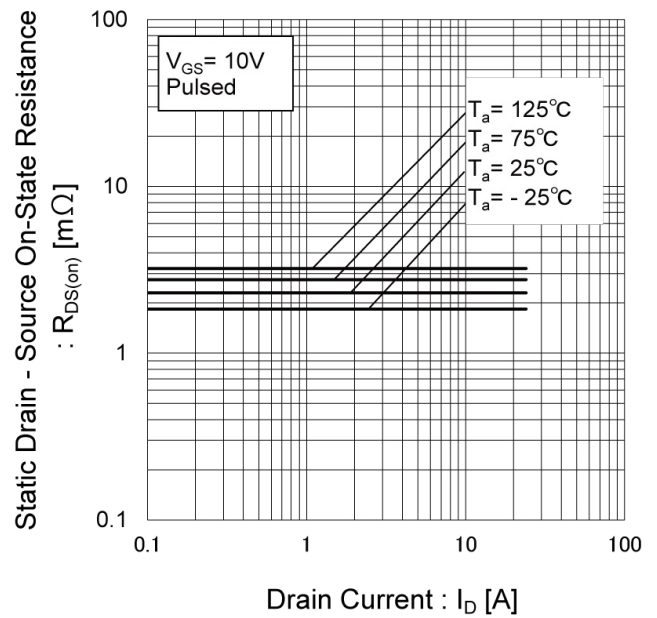
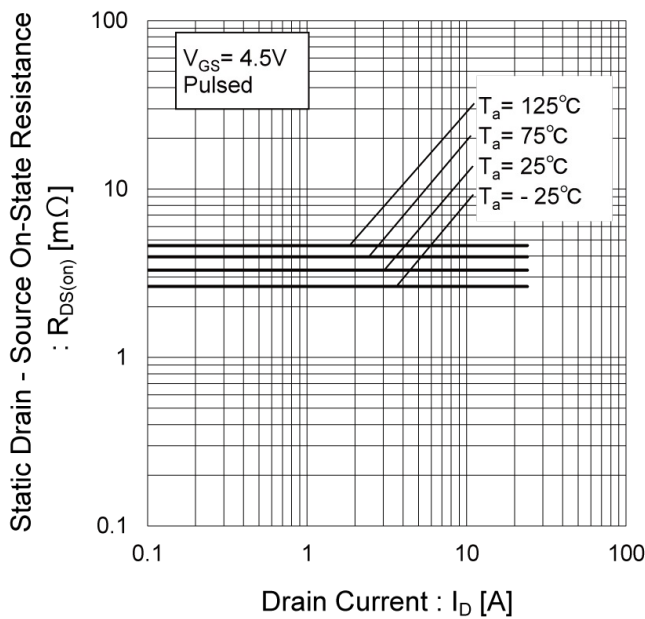


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)





●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

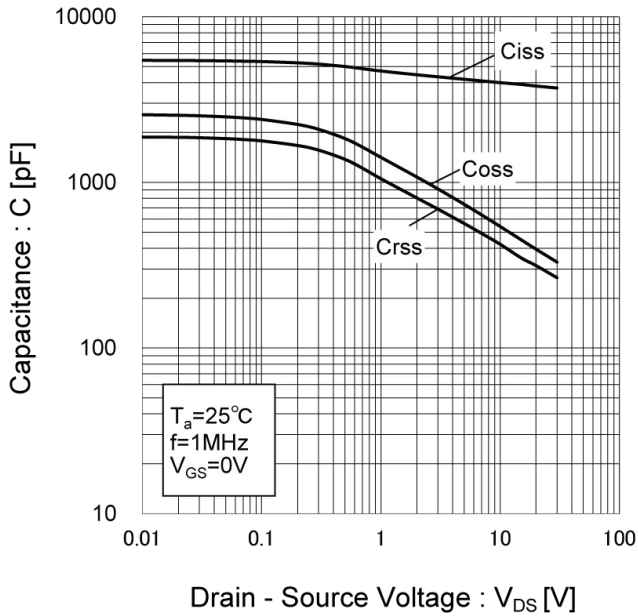


Fig.18 Switching Characteristics

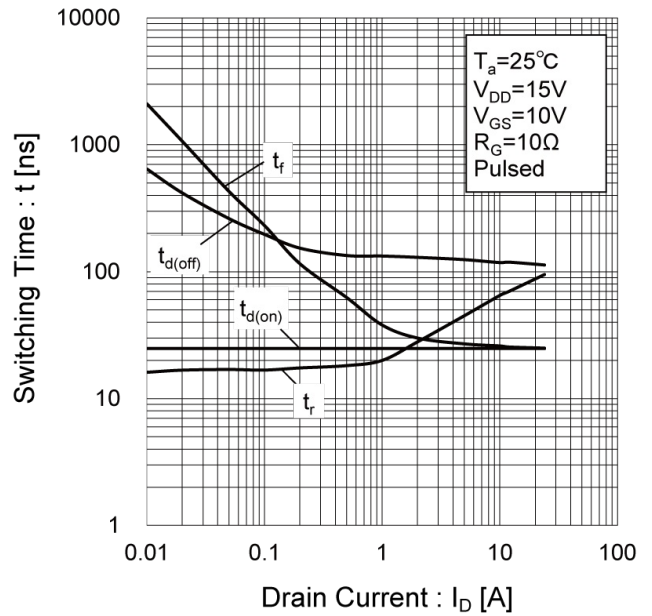


Fig.19 Dynamic Input Characteristics

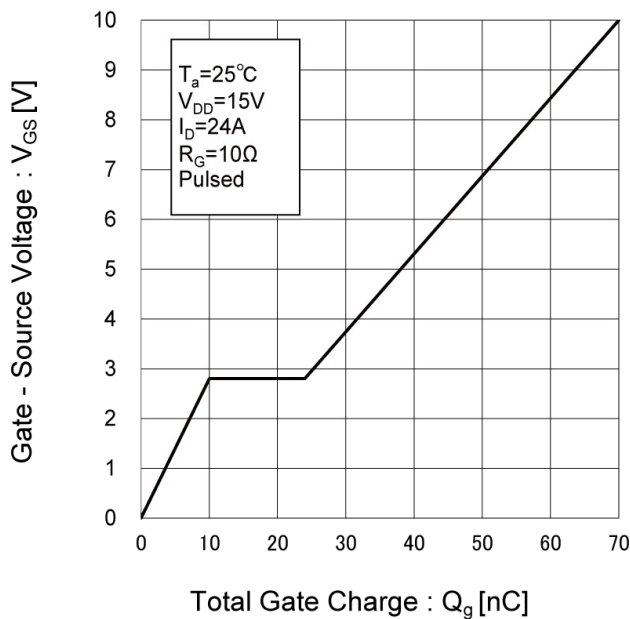
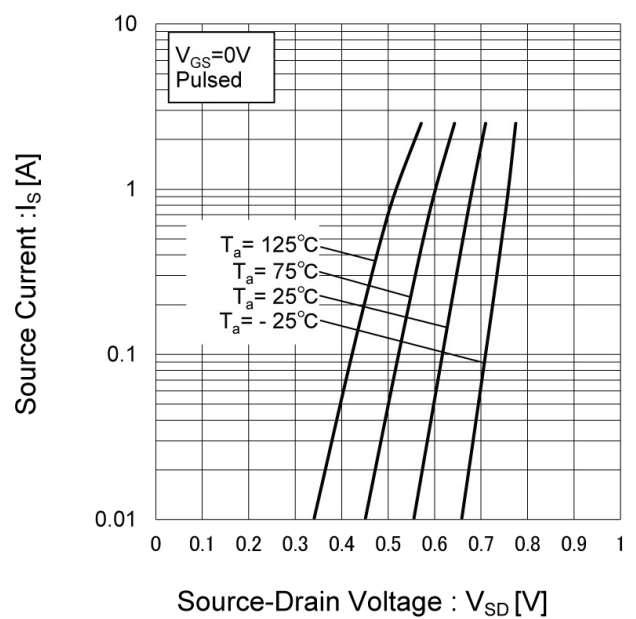


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

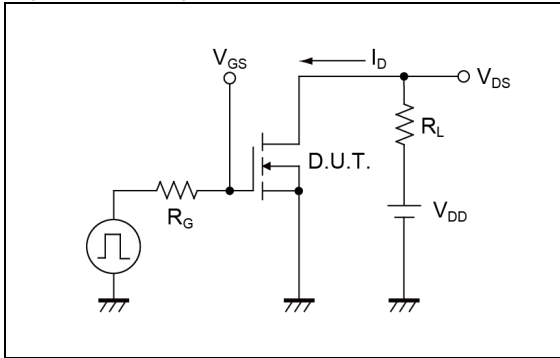


Fig.1-2 Switching Waveforms

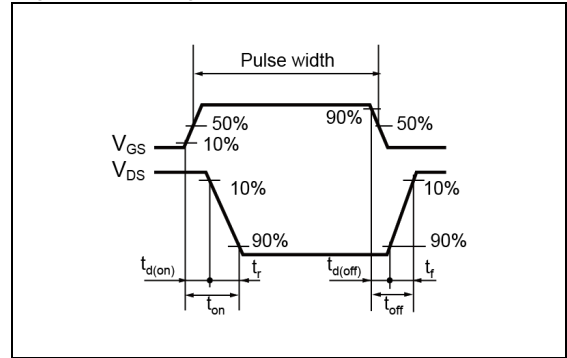


Fig.2-1 Gate Charge Measurement Circuit

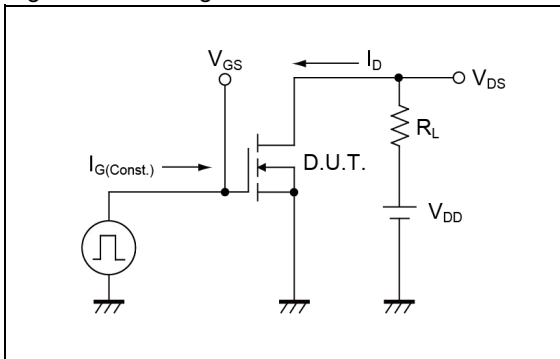
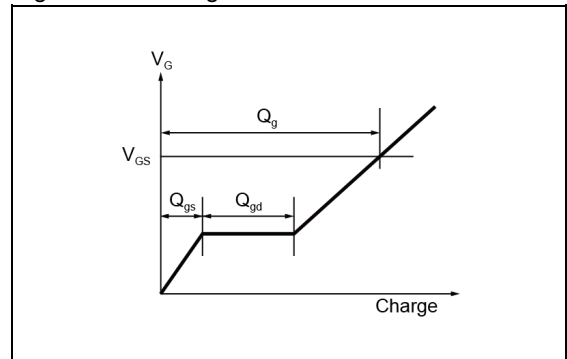


Fig.2-2 Gate Charge Waveform

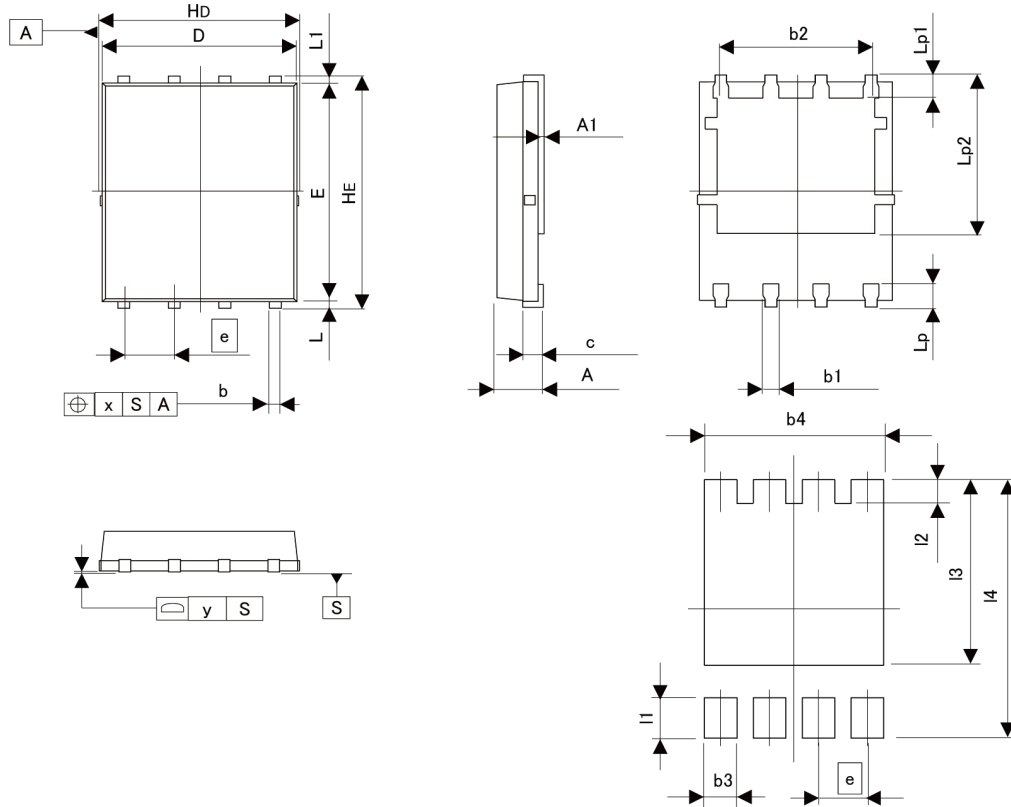


● Notice

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

●Dimensions

HSOP8



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

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	3.92	4.32	0.154	0.170
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		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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