

$V_{DSS}$	30V
$R_{DS(on)}(Max.)$	6.7mΩ
$I_D$	±17A
$P_D$	3.0W

### ●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.

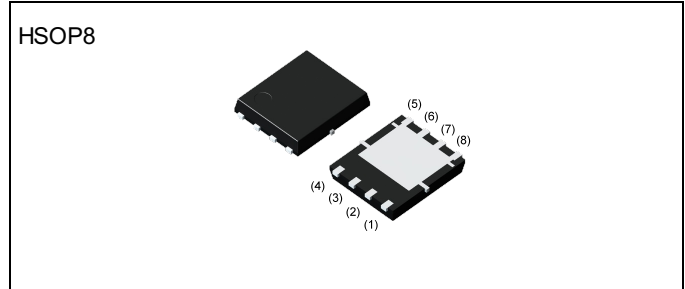
### ●Application

Switching

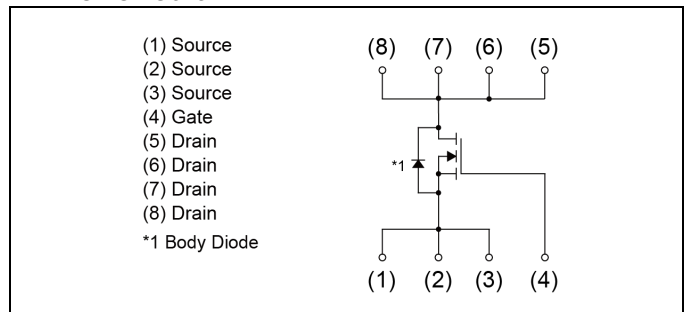
### ●Absolute maximum ratings ( $T_a = 25^{\circ}C$ )

Parameter	Symbol	Value	Unit	
Drain - Source voltage	$V_{DSS}$	30	V	
Continuous drain current	$T_c = 25^{\circ}C$	$I_D^{*1}$	±40	A
	$T_a = 25^{\circ}C$	$I_D$	±17	A
Pulsed drain current	$I_{D,pulse}^{*2}$	±68	A	
Gate - Source voltage	$V_{GSS}$	±20	V	
Avalanche energy, single pulse	$E_{AS}^{*3}$	21.9	mJ	
Avalanche current	$I_{AS}^{*3}$	17	A	
Power dissipation	$P_D^{*1}$	23.7	W	
	$P_D^{*4}$	3.0	W	
Junction temperature	$T_j$	150	°C	
Range of storage temperature	$T_{stg}$	-55 to +150	°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	RS1E170GN

### ● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	$R_{thJA}^{*4}$	-	-	41.7	°C/W
Thermal resistance, junction - case	$R_{thJC}^{*1}$	-	-	5.3	°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 $25^\circ\text{C}$	-	28	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 24V, V_{GS} = 0V$	-	-	1	$\mu\text{A}$
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1mA$	1.2	-	2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to $25^\circ\text{C}$	-	-3.87	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*5}$	$V_{GS} = 10V, I_D = 17A$	-	5.1	6.7	m $\Omega$
		$V_{GS} = 4.5V, I_D = 17A$	-	6.7	8.7	
Gate input resistance	$R_G$	f=1MHz, open drain	-	1.6	-	$\Omega$
Forward Transfer Admittance	$ Y_{fs} ^{*5}$	$V_{DS} = 5V, I_D = 17A$	13.0	-	-	S

\*1  $T_c = 25^\circ\text{C}$

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

\*3  $L \approx 0.1\text{mH}$ ,  $V_{DD} = 15V$ ,  $R_G = 25\Omega$ , 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<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V	-	720	-	pF
Output capacitance	C <sub>oss</sub>	V <sub>DS</sub> = 15V	-	240	-	
Reverse transfer capacitance	C <sub>rss</sub>	f = 1MHz	-	52	-	
Turn - on delay time	t <sub>d(on)</sub> <sup>*5</sup>	V <sub>DD</sub> ≈ 15V, V <sub>GS</sub> = 10V	-	10.0	-	ns
Rise time	t <sub>r</sub> <sup>*5</sup>	I <sub>D</sub> = 8.5A	-	4.8	-	
Turn - off delay time	t <sub>d(off)</sub> <sup>*5</sup>	R <sub>L</sub> ≈ 1.76Ω	-	27.0	-	
Fall time	t <sub>f</sub> <sup>*5</sup>	R <sub>G</sub> = 10Ω	-	3.7	-	

**●Gate charge characteristics (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit	
			Min.	Typ.	Max.		
Total gate charge	Q <sub>g</sub> <sup>*5</sup>	V <sub>DD</sub> ≈ 15V I <sub>D</sub> = 17A	V <sub>GS</sub> = 10V	-	12.0	-	nC
Gate - Source charge	Q <sub>gs</sub> <sup>*5</sup>		V <sub>GS</sub> = 4.5V	-	5.9	-	
Gate - Drain charge	Q <sub>gd</sub> <sup>*5</sup>			-	2.5	-	
				-	1.6	-	

**●Body diode electrical characteristics (Source-Drain) (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I <sub>S</sub>	T <sub>a</sub> = 25°C	-	-	2.5	A
Body diode pulse current	I <sub>SP</sub> <sup>*2</sup>		-	-	68	A
Forward voltage	V <sub>SD</sub> <sup>*5</sup>	V <sub>GS</sub> = 0V, I <sub>S</sub> = 2.5A	-	-	1.2	V
Reverse recovery time	t <sub>rr</sub> <sup>*5</sup>	I <sub>S</sub> = 17A, V <sub>GS</sub> = 0V	-	22.0	-	ns
Reverse recovery charge	Q <sub>rr</sub> <sup>*5</sup>	di/dt = 100A/μs	-	13.0	-	nC

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

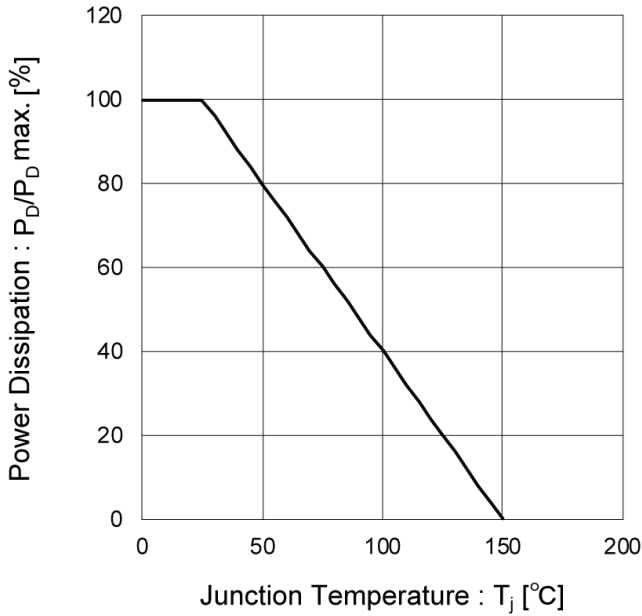


Fig.2 Maximum Safe Operating Area

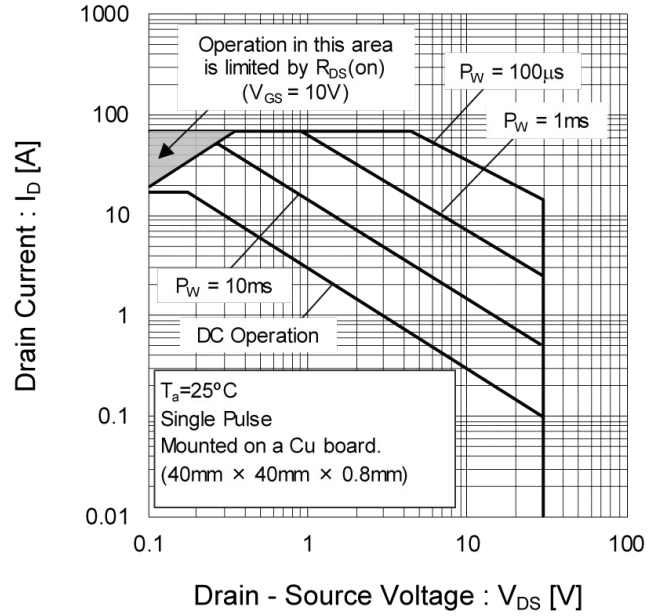


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

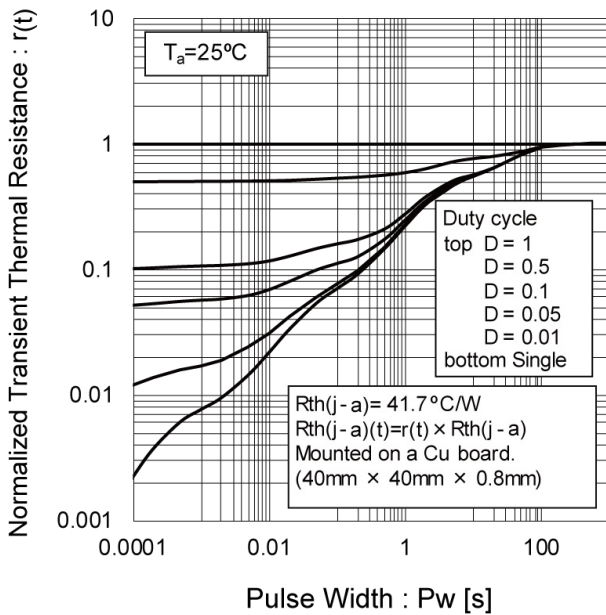
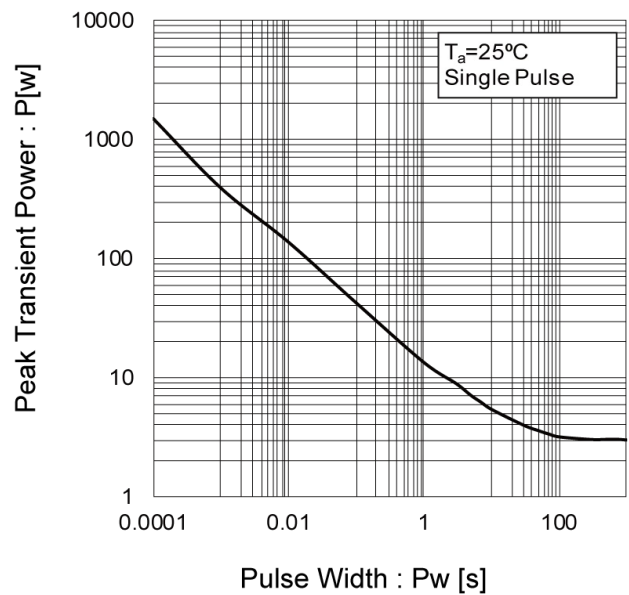


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

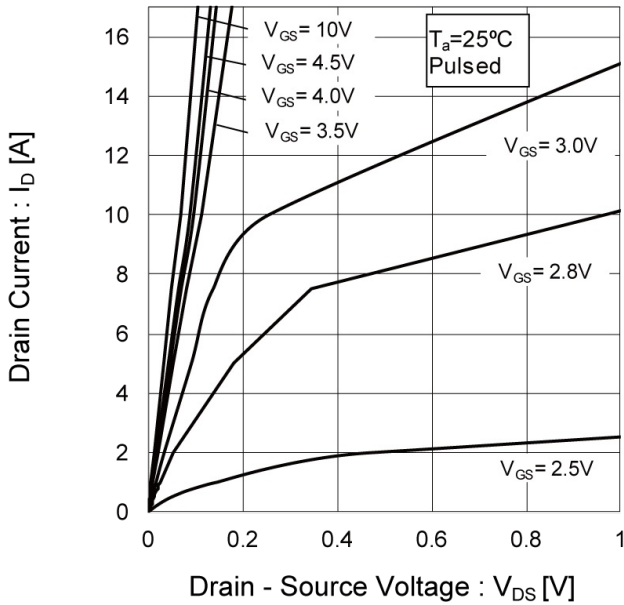


Fig.6 Typical Output Characteristics(II)

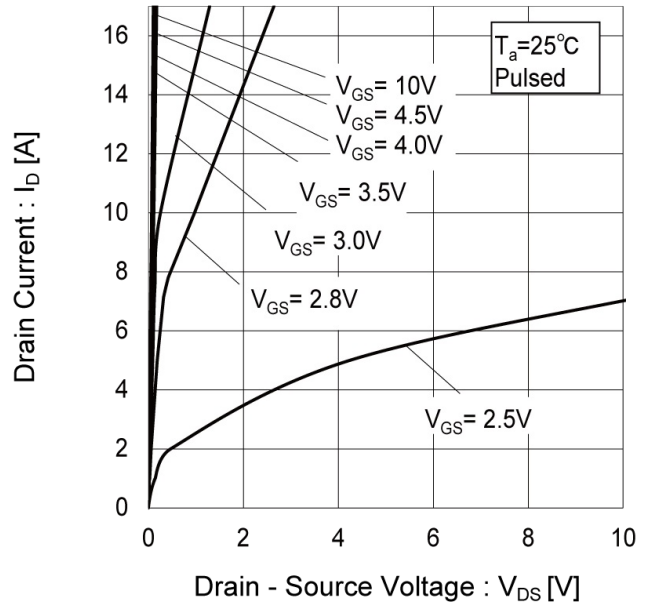


Fig.7 Breakdown Voltage vs. Junction Temperature

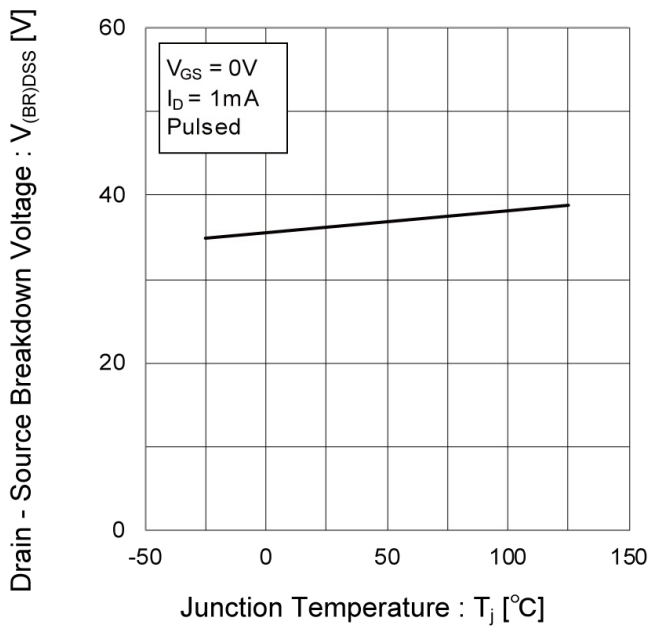
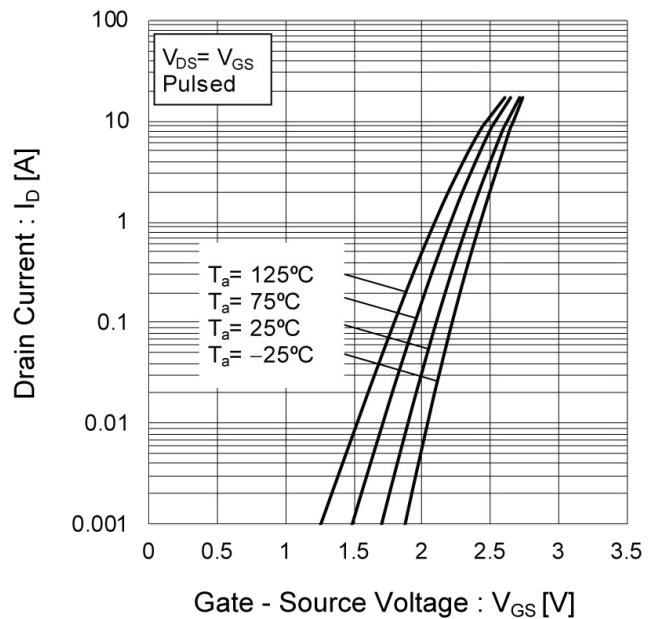


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

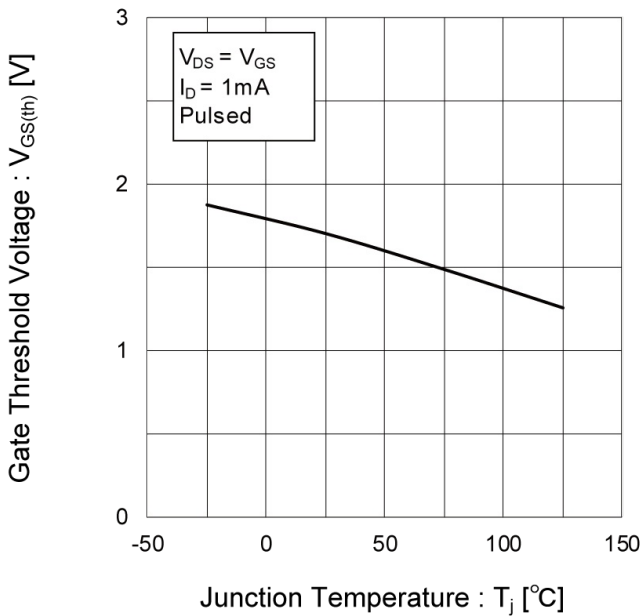


Fig.10 Forward Transfer Admittance vs. Drain Current

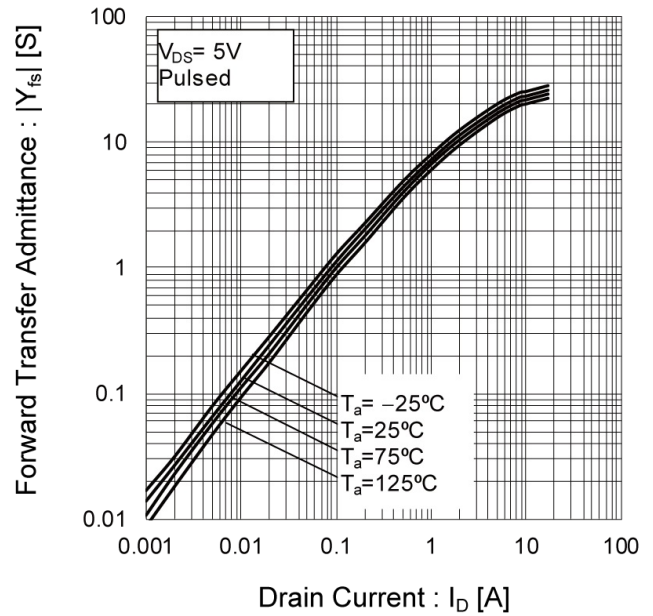


Fig.11 Drain Current Derating Curve

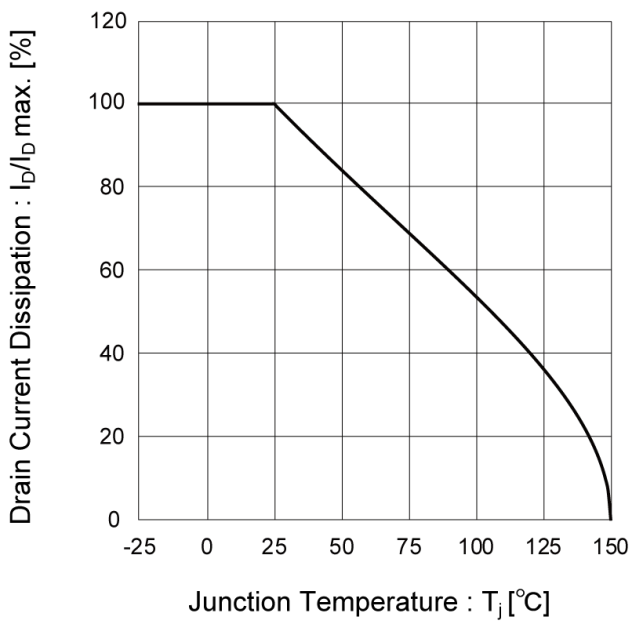
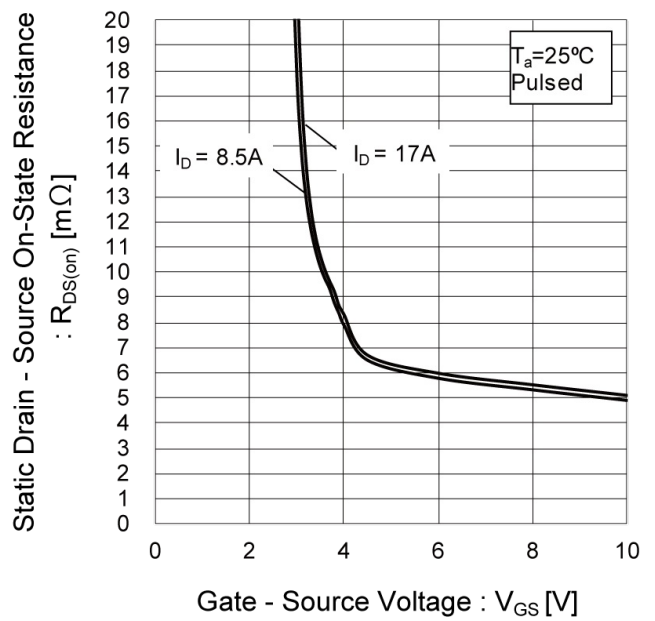


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



● Electrical characteristic curves

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

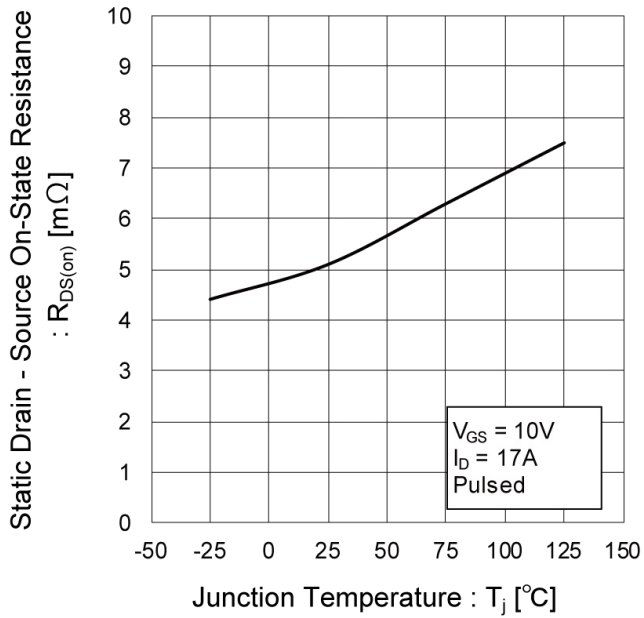


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current (I)

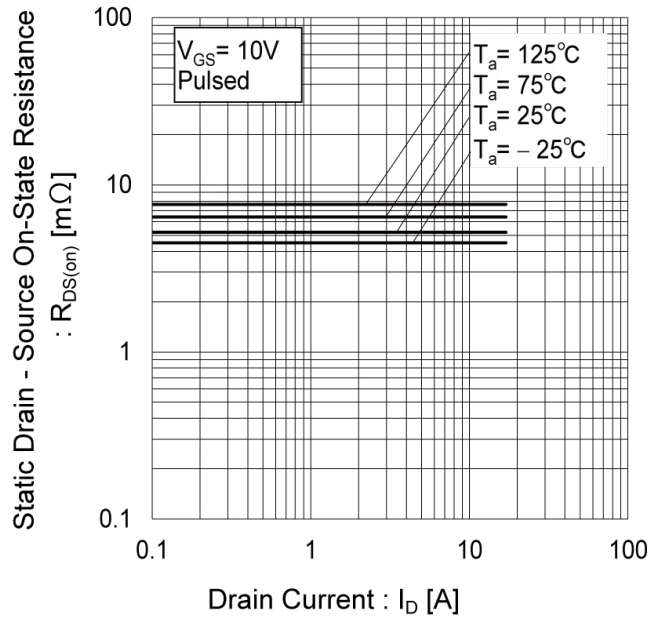
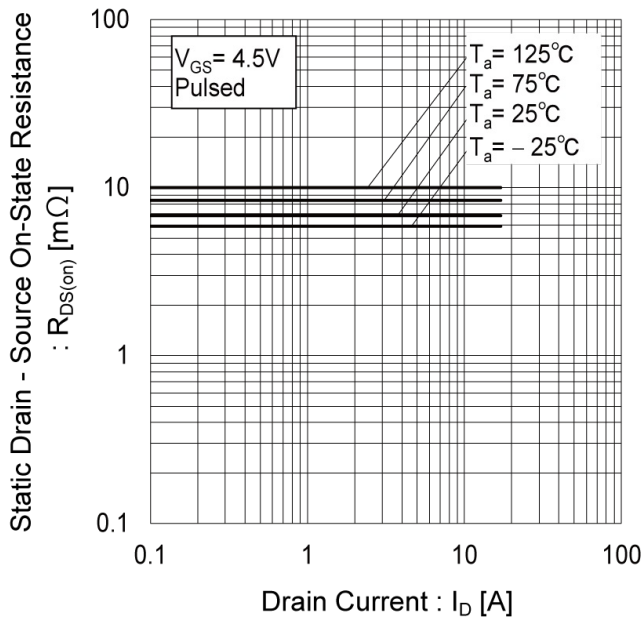


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

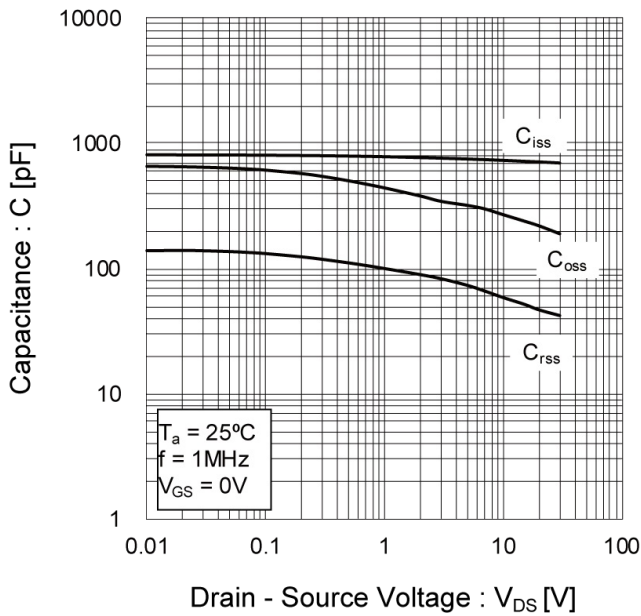


Fig.17 Switching Characteristics

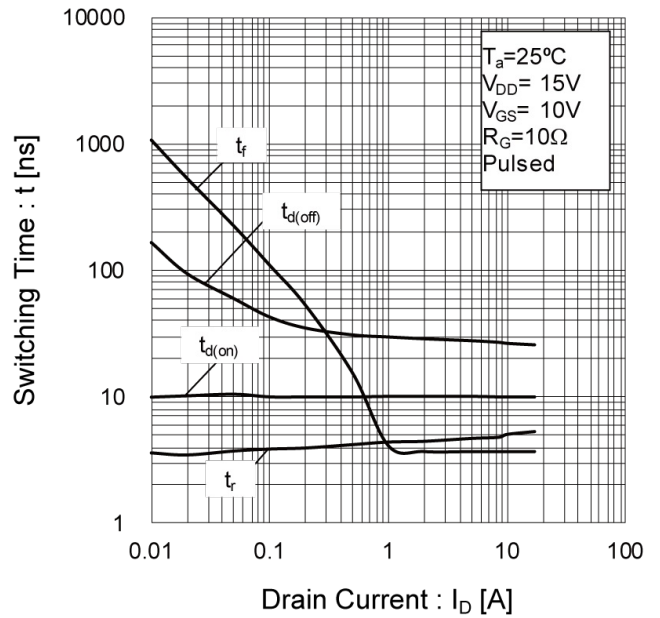


Fig.18 Dynamic Input Characteristics

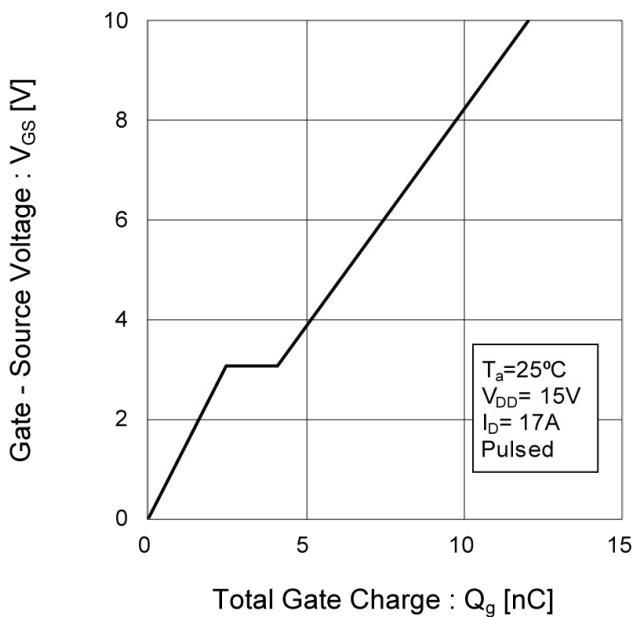
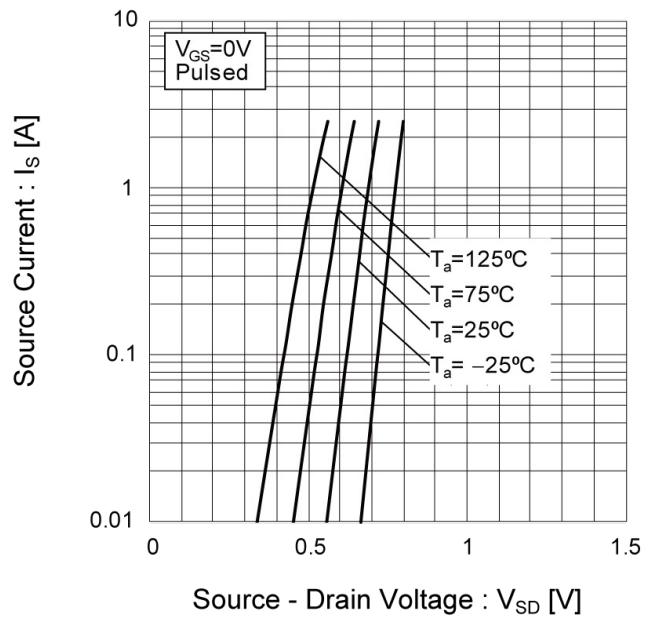


Fig.19 Source Current vs. Source Drain Voltage





● 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



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

HSOP8 (5 x 6)



Pattern of terminal position areas  
[Not a 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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