

$V_{DSS}$	30V
$R_{DS(on)}(Max.)$	5.0m $\Omega$
$I_D$	14A
$P_D$	3W

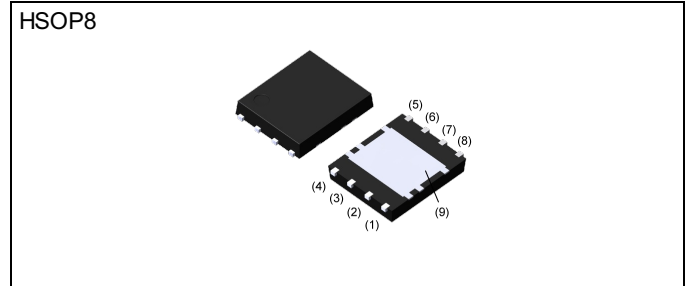
### ●Features

- 1) Low on - resistance.
- 2) Pb-free lead plating ; RoHS compliant.
- 3) Halogen Free.

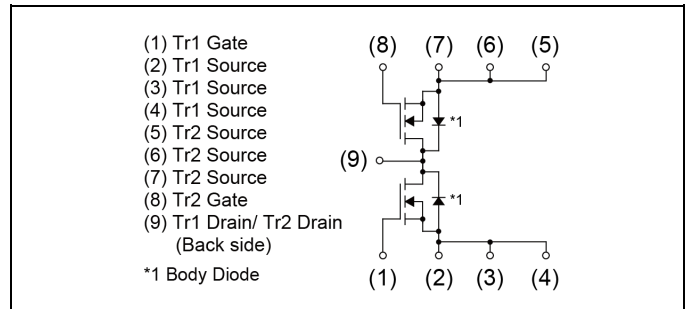
### ●Application

Load Switch  
LiB charging and discharging switch

### ●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	HP8KA1

### ●Absolute maximum ratings ( $T_a = 25^\circ\text{C}$ ) <It is the same ratings for the Tr1 and Tr2>

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	30	V
Continuous drain current	$I_D^{*1}$	14	A
Pulsed drain current	$I_{D,pulse}^{*2}$	28	A
Gate - Source voltage	$V_{GSS}$	$\pm 20$	V
Power dissipation	$P_D^{*3}$	3	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	$R_{thJA}^{*3}$	-	41	-	°C/W

### ● Electrical characteristics ( $T_a = 25^\circ\text{C}$ ) <It is the same characteristics for the Tr1 and Tr2>

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	-	21	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 24V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = 10V, I_D = 10mA$	1.0	-	2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to	-	-3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 10V, I_D = 14A$	-	3.5	5.0	mΩ
		$V_{GS} = 4.5V, I_D = 14A$	-	5.0	7.0	
Transconductance	$g_{fs}^{*4}$	$V_{DS} = 5V, I_D = 14A$	14	-	-	S

\*1 Limited only by maximum temperature allowed.

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

\*3 Mounted on 40mm×40mm Cu BOARD

\*4 Pulsed

● **Electrical characteristics** ( $T_a = 25^\circ\text{C}$ ) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$V_{GS} = 0V$	-	2550	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = 15V$	-	330	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	270	-	
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} \approx 15V, V_{GS} = 10V$	-	25	-	ns
Rise time	$t_r^{*4}$	$I_D = 7A$	-	30	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L = 2.1\Omega$	-	85	-	
Fall time	$t_f^{*4}$	$R_G = 10\Omega$	-	40	-	

● **Gate charge characteristics** ( $T_a = 25^\circ\text{C}$ ) <It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	$Q_g^{*4}$	$V_{DD} \approx 15V, I_D = 14A$ $V_{GS} = 4.5V$	-	24	-	nC
Gate - Source charge	$Q_{gs}^{*4}$		-	7.5	-	
Gate - Drain charge	$Q_{gd}^{*4}$		-	9.0	-	

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

<It is the same characteristics for the Tr1 and Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	$I_S^{*1}$	$T_a = 25^\circ\text{C}$	-	-	2.5	A
Body diode pulse current	$I_{SP}^{*2}$		-	-	28	
Forward voltage	$V_{SD}^{*4}$	$V_{GS} = 0V, I_S = 2.5A$	-	-	1.2	V

● **Electrical characteristics curves** <It is the same characteristics for the Tr1 and Tr2>

Fig.1 Power Dissipation Derating Curve



Fig.2 Maximum Safe Operating Area

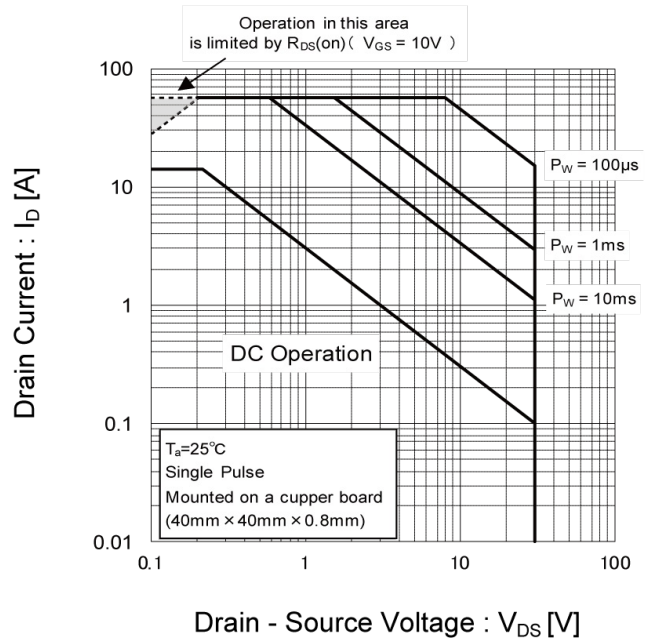


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

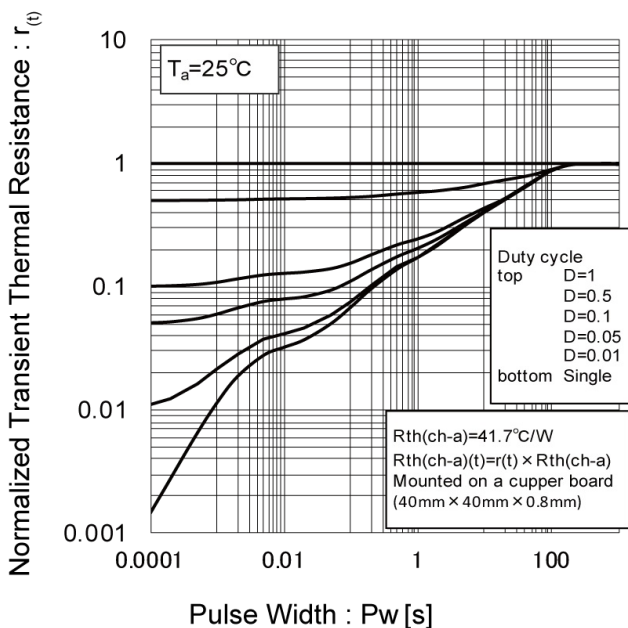
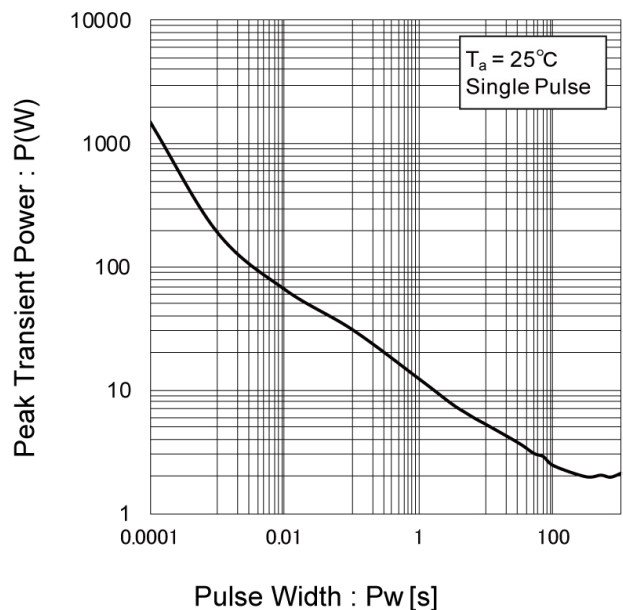


Fig.4 Single Pulse Maximum Power dissipation



● **Electrical characteristics curves** <It is the same characteristics for the Tr1 and Tr2>

Fig.5 Typical Output Characteristics(I)

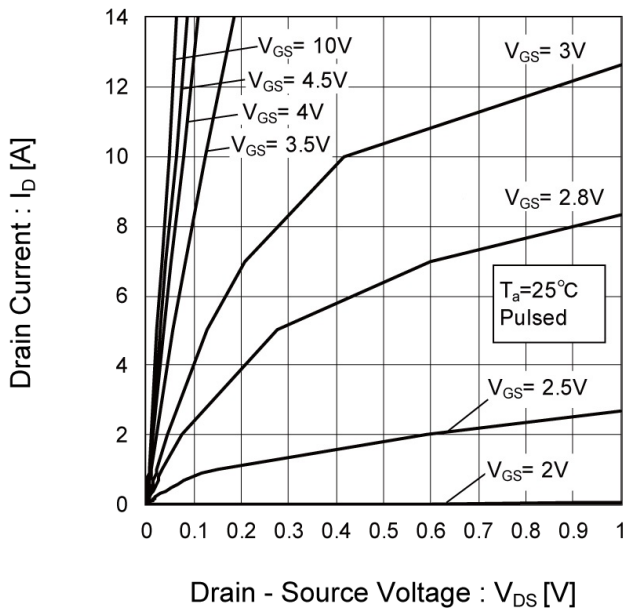


Fig.6 Typical Output Characteristics(II)

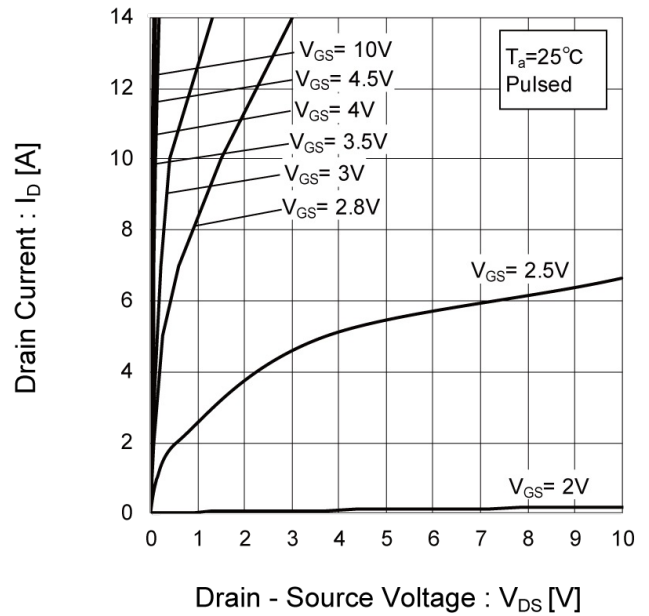
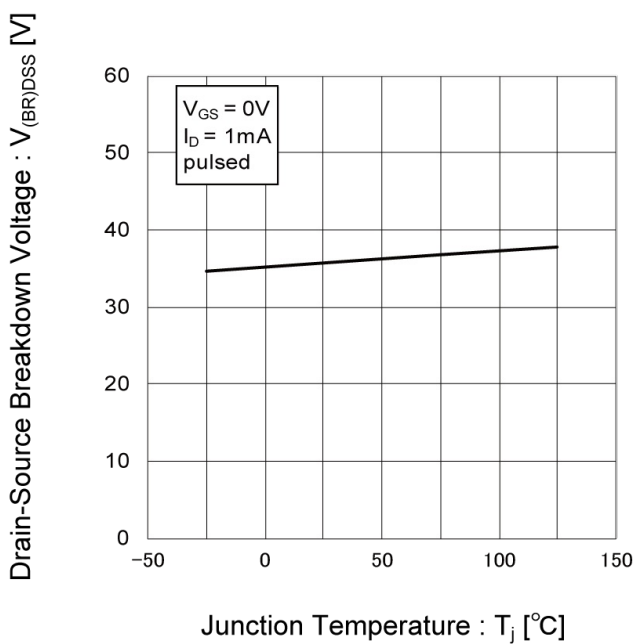


Fig.7 Breakdown Voltage vs. Junction Temperature



● **Electrical characteristics curves** <It is the same characteristics for the Tr1 and Tr2>

Fig.8 Typical Transfer Characteristics

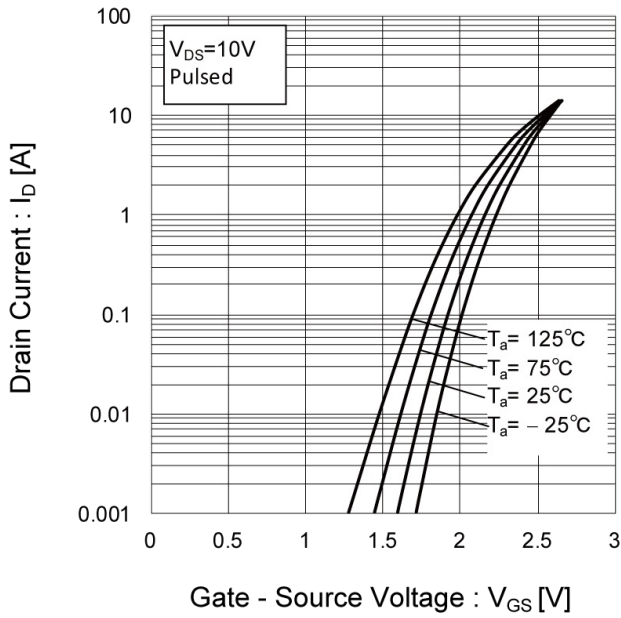


Fig.9 Gate Threshold Voltage vs. Junction Temperature

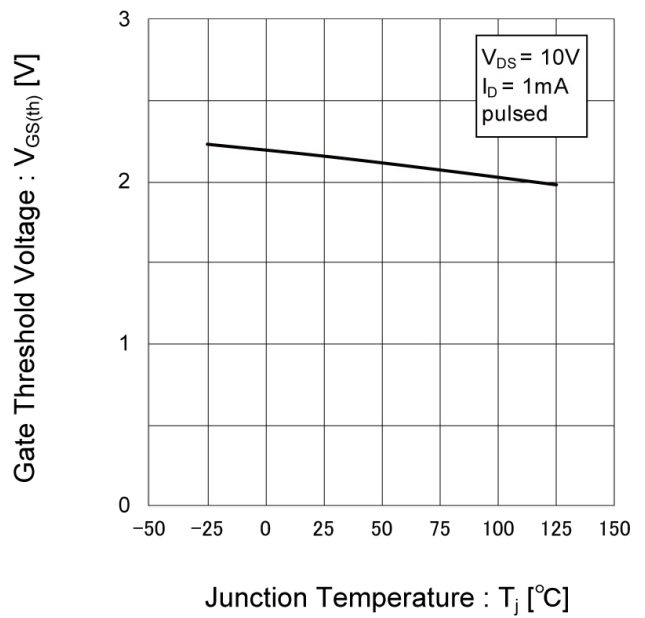
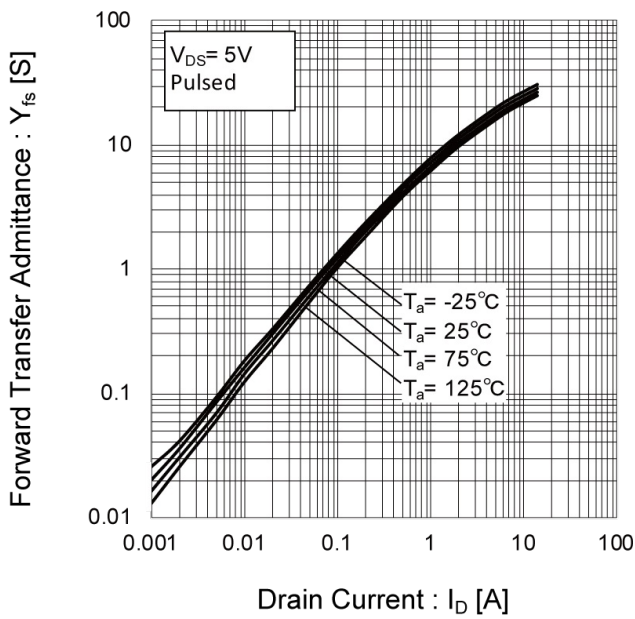


Fig.10 Transconductance vs. Drain Current



● **Electrical characteristics curves** <It is the same characteristics for the Tr1 and Tr2>

Fig.11 Drain Current Derating Curve



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

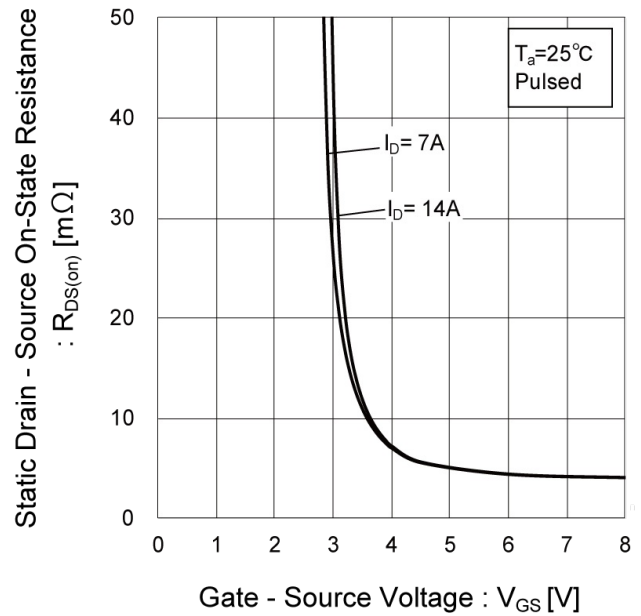
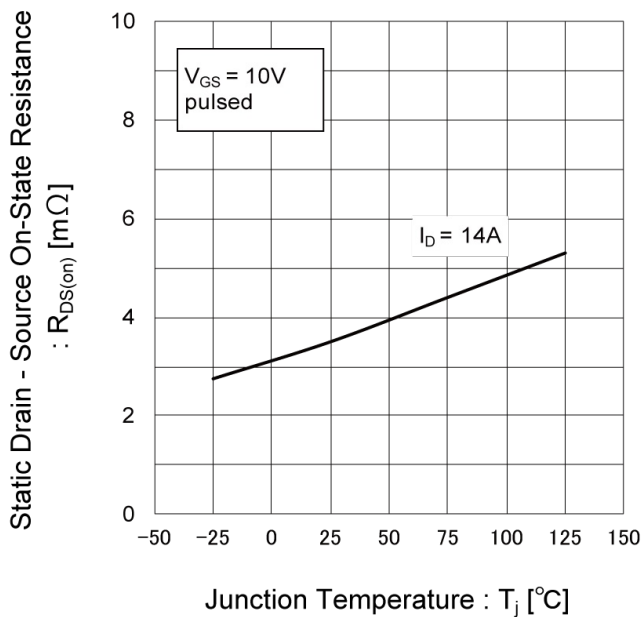


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● **Electrical characteristics curves** <It is the same characteristics for the Tr1 and Tr2>

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

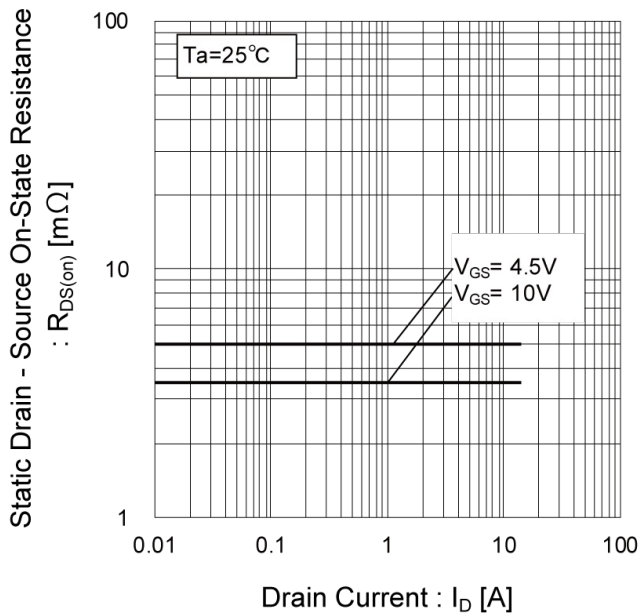


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

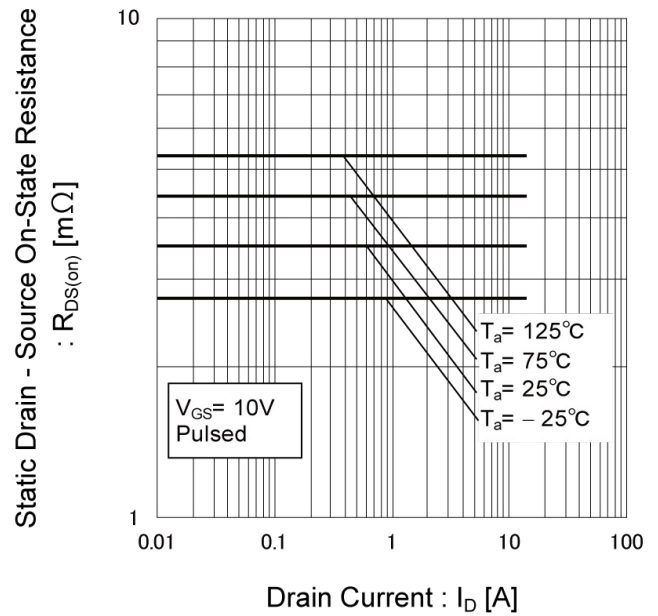
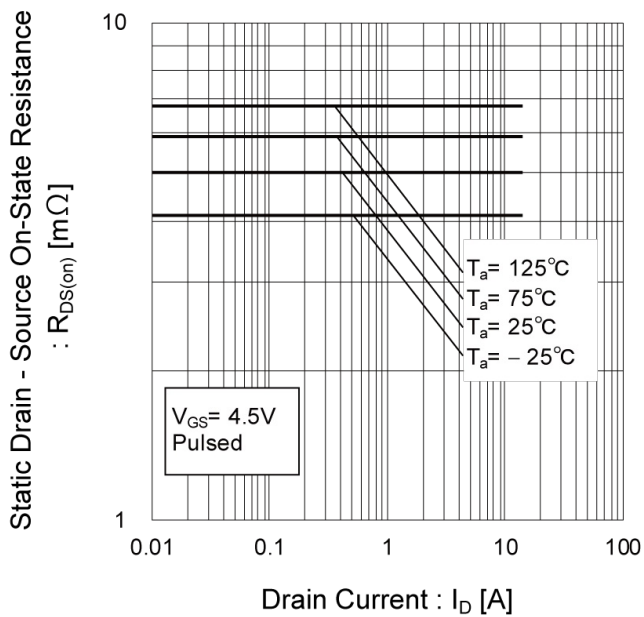


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)





●Electrical characteristics curves <It is the same characteristics for the Tr1 and Tr2>

Fig.17 Typical Capacitance vs. Drain - Source Voltage

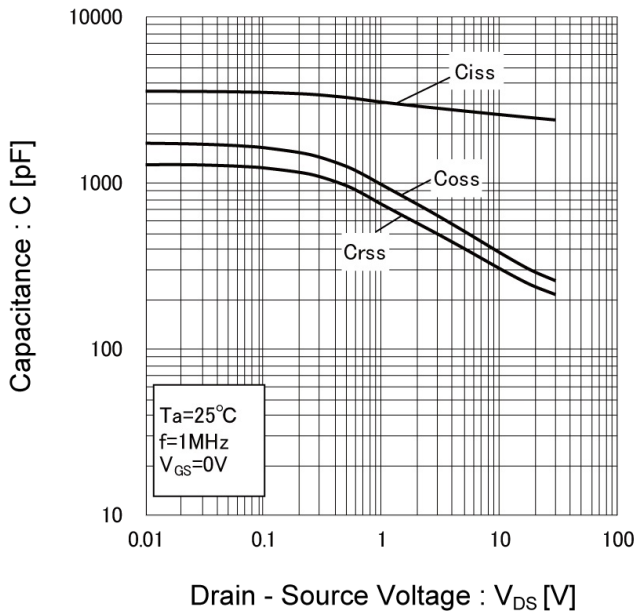


Fig.18 Switching Characteristics

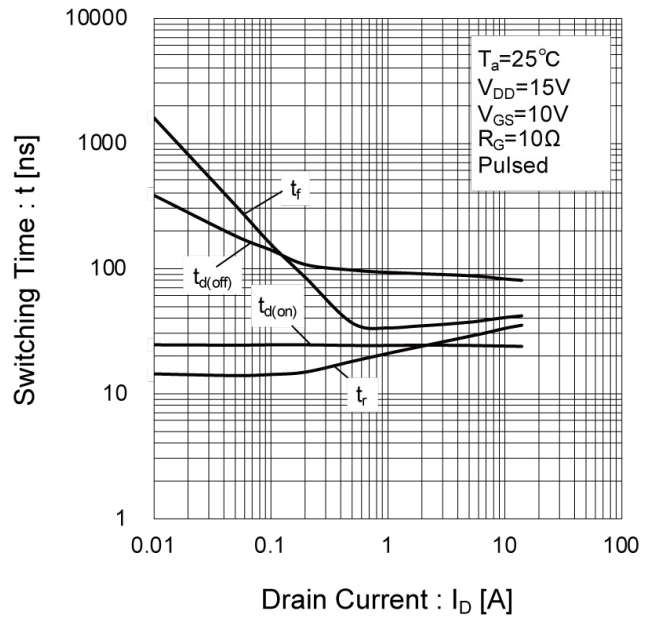


Fig.19 Dynamic Input Characteristics

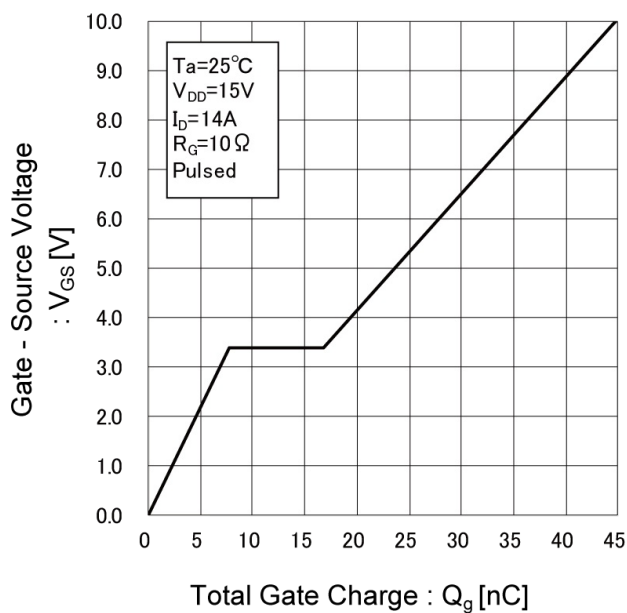
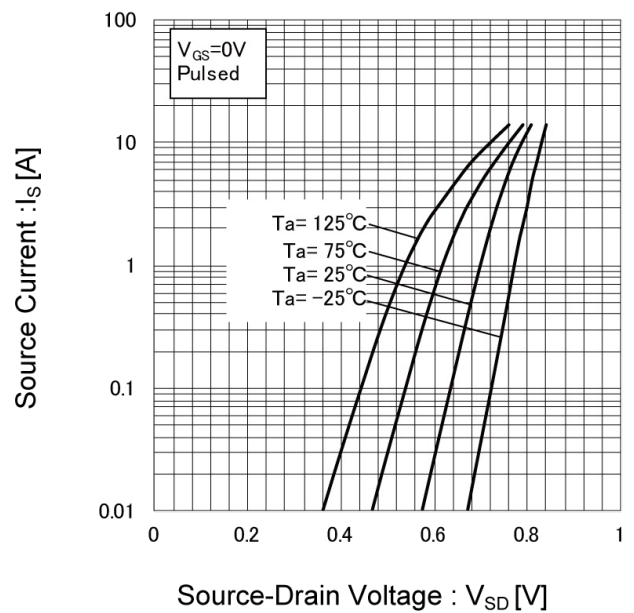


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

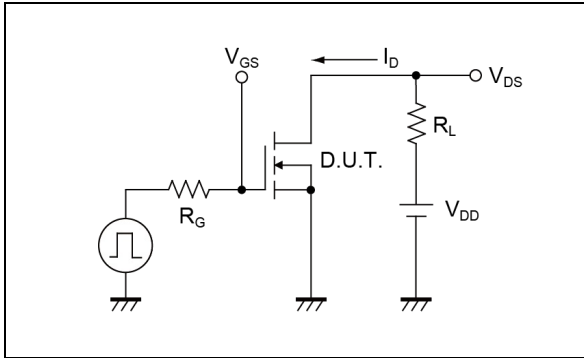


Fig.1-2 Switching Waveforms

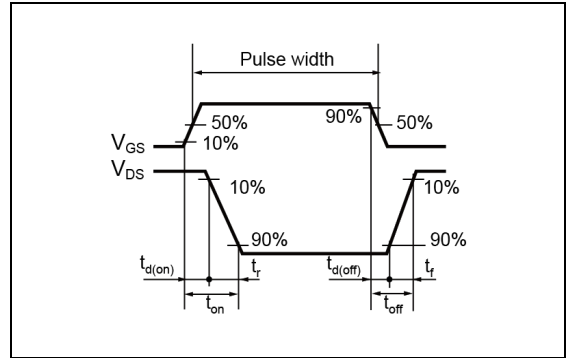


Fig.2-1 Gate Charge Measurement Circuit

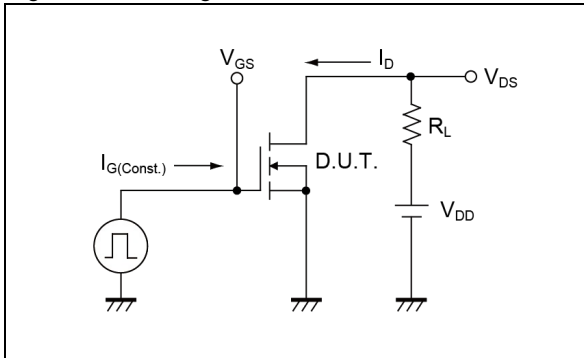
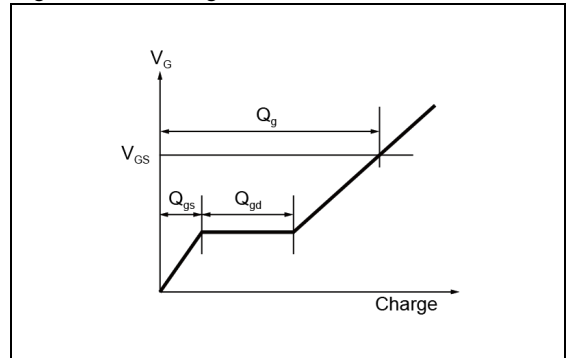
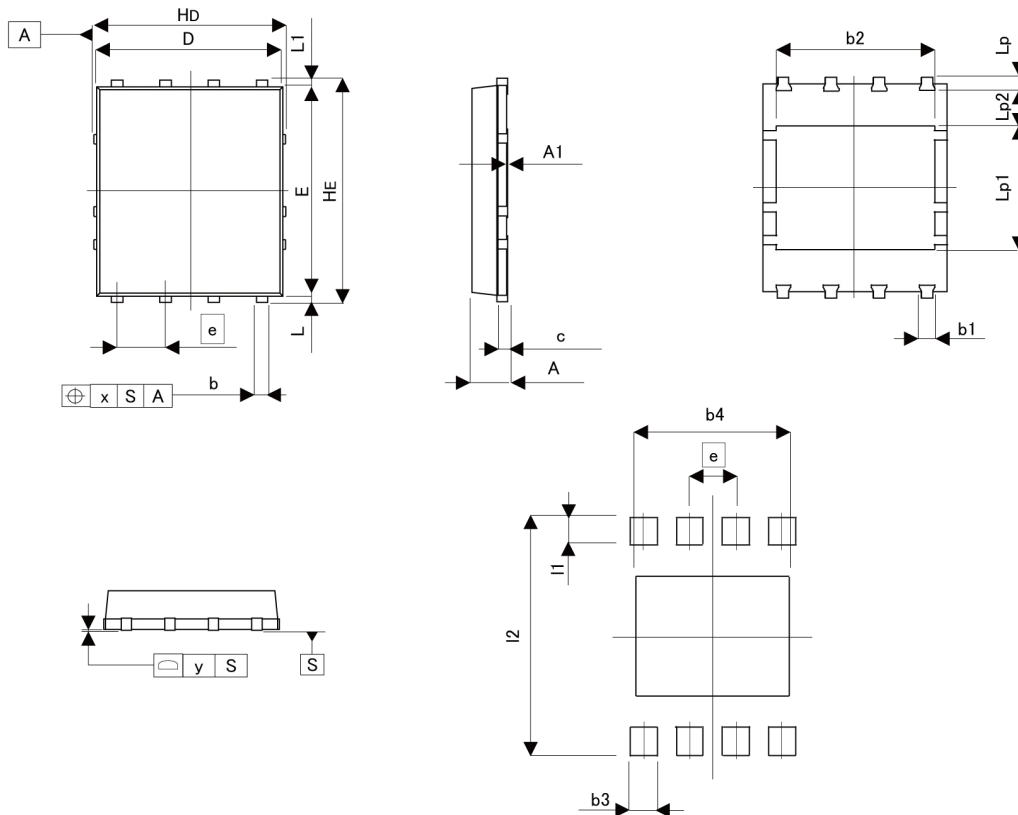


Fig.2-2 Gate Charge Waveform



●Dimensions

HSOP8 (Drain common)



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	0.22	0.52	0.009	0.020
b2	4.00	4.40	0.157	0.173
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	0.27	0.47	0.011	0.019
Lp1	3.12	3.52	0.123	0.139
Lp2	0.97		0.038	
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b3	-	0.62	-	0.024
b4	-	4.40	-	0.173
I1	-	0.57	-	0.022
I2	-	6.10	-	0.240

Dimension in mm/inches

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