RT1A060AP

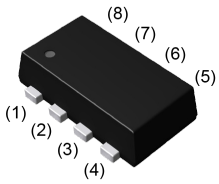
Pch -12V -6A Middle Power MOSFET

Datasheet

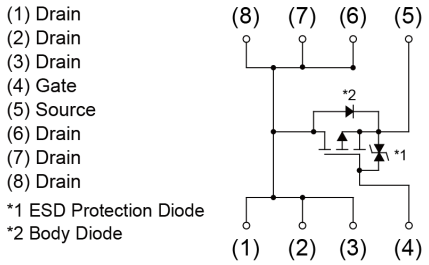
V_{DSS}	-12V
$R_{DS(on)}$(Max.)	19mΩ
I_D	±6A
P_D	1.25W

●Outline

TSST8



●Inner circuit



●Features

1) Low on - resistance.
2) -1.5V Drive.
3) Built-in G-S Protection Diode.
4) Small Surface Mount Package (TSST8).
5) Pb-free lead plating ; RoHS compliant

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8
	Basic ordering unit (pcs)	3000
	Taping code	TR
	Marking	SG

●Application

Switching

●Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	-12	V
Continuous drain current	I_D	±6	A
Pulsed drain current	$I_{D,pulse}$ *1	±18	A
Gate - Source voltage	V_{GSS}	0～-8	V
Power dissipation	P_D *2	1.25	W
	P_D *3	0.6	W
Junction temperature	T_j	150	℃
Range of storage temperature	T_{stg}	-55 to +150	℃

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●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}*2	-	-	100	℃/W
	R_{thJA}*3	-	-	208	℃/W

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = -1mA	-12	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	-5.0	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = -12V, V_{GS} = 0V	-	-	-10	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = -8V, V_{DS} = 0V	-	-	-10	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = -6V, I_D = -1mA	-0.3	-	-1.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	2.7	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$*4	V_{GS} = -4.5V, I_D = -6A	-	14	19	mΩ
		V_{GS} = -2.5V, I_D = -3A	-	17	24	
		V_{GS} = -1.8V, I_D = -3A	-	22	33	
		V_{GS} = -1.5V, I_D = -1.2A	-	27	54	
Gate input resistance	R_G	f = 1MHz, open drain	-	8	-	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$*4	V_{DS} = -6V, I_D = -6A	9	-	-	S

*1 Pw≦10μs , Duty cycle≦1%

*2 Mounted on a ceramic board (30x30x0.8mm)

*3 Mounted on a FR4 (20x20x0.8mm)

*4 Pulsed

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●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	7800	-	pF
Output capacitance	C_{oss}	V_{DS} = -6V	-	900	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	850	-	
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} ≃ -6V,V_{GS} = -4.5V	-	25	-	ns
Rise time	t_r *4	I_D = -3A	-	100	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L ≃ 2Ω	-	580	-	
Fall time	t_f *4	R_G = 10Ω	-	260	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	V_{DD} ≃ -6V, I_D = -6A, V_{GS} = -4.5V	-	80	-	nC
Gate - Source charge	Q_{gs} *4		-	12	-	
Gate - Drain charge	Q_{gd} *4		-	13	-	

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S	T_a = 25°C	-	-	-1	A
Body diode pulse current	I_{SP} *1		-	-	-18	A
Forward voltage	V_{SD} *4	V_{GS} = 0V, I_S = -6A	-	-	-1.2	V

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

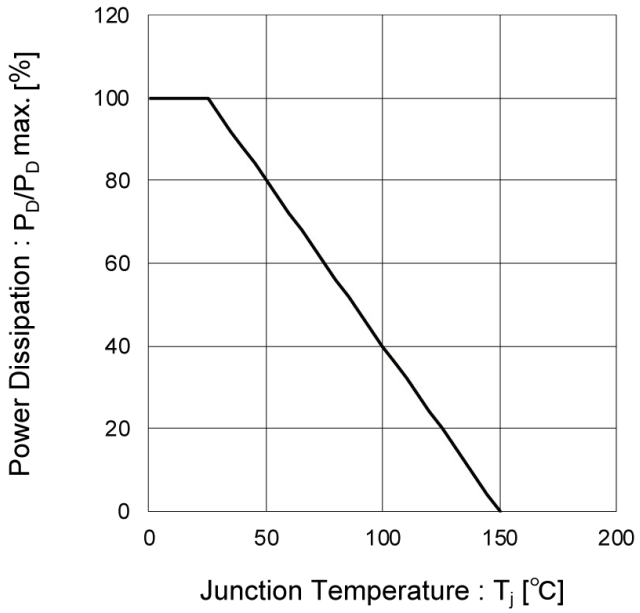


Fig.2 Maximum Safe Operating Area

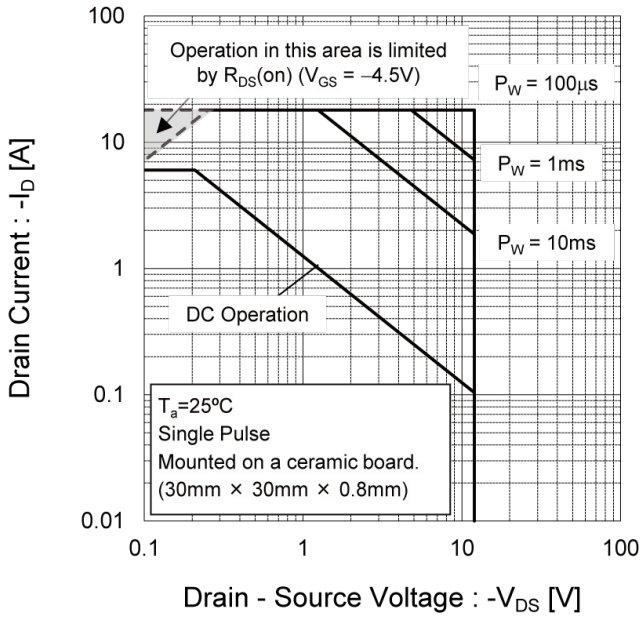


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

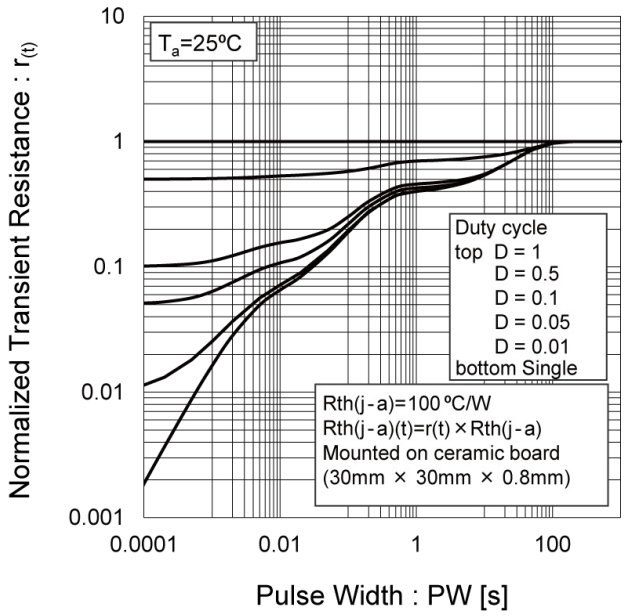
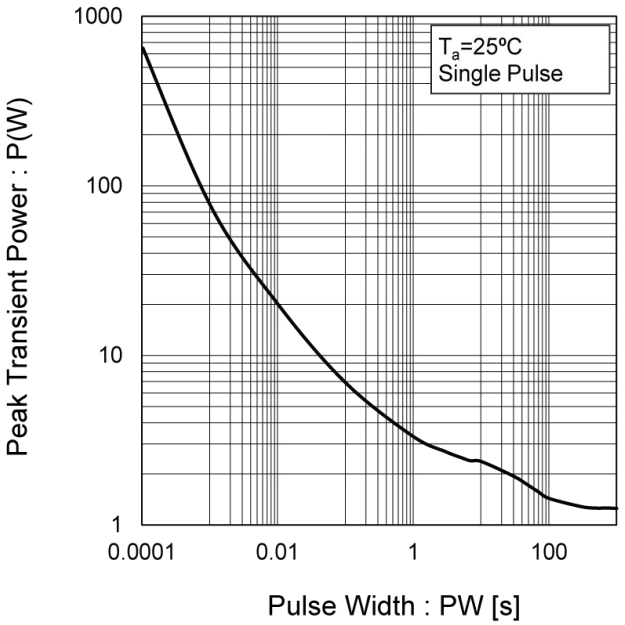


Fig.4 Single Pulse Maximum Power dissipation



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●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

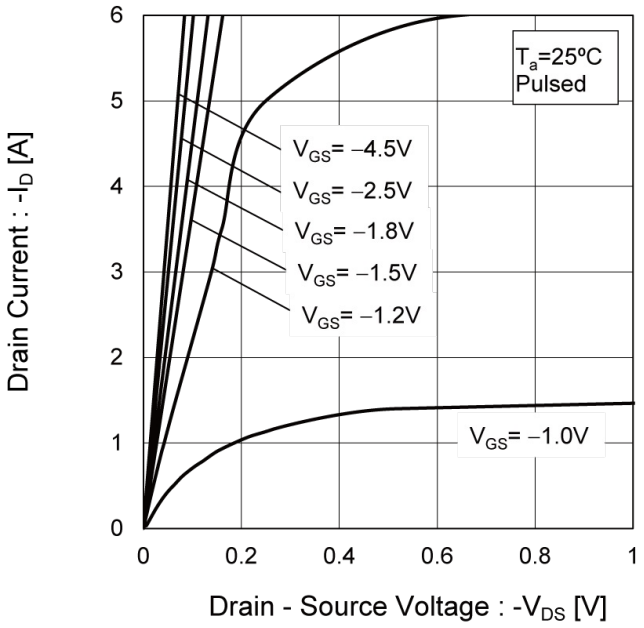


Fig.6 Typical Output Characteristics(II)

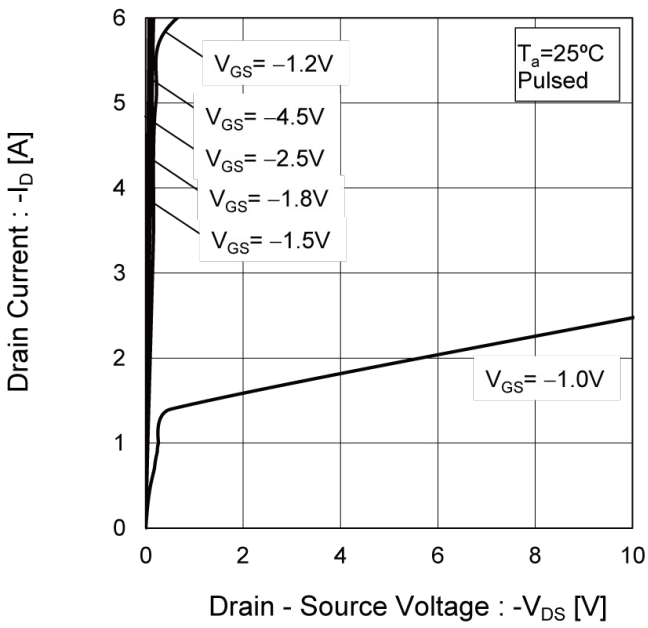


Fig.7 Breakdown Voltage vs. Junction Temperature

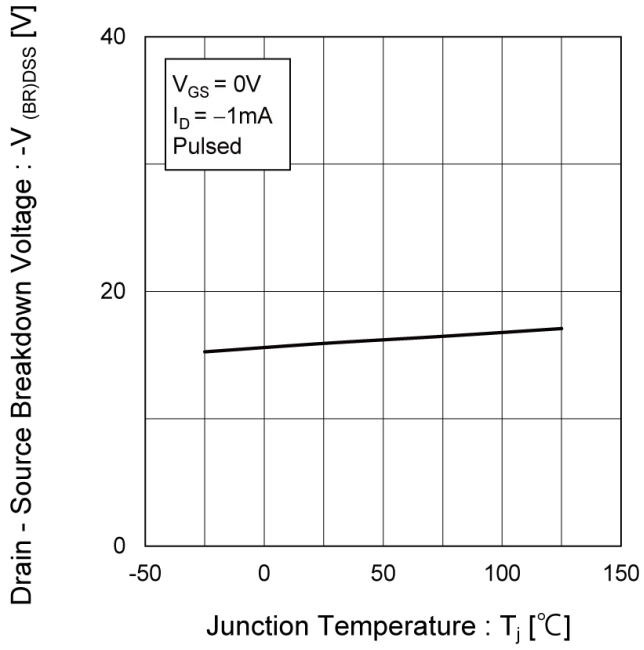
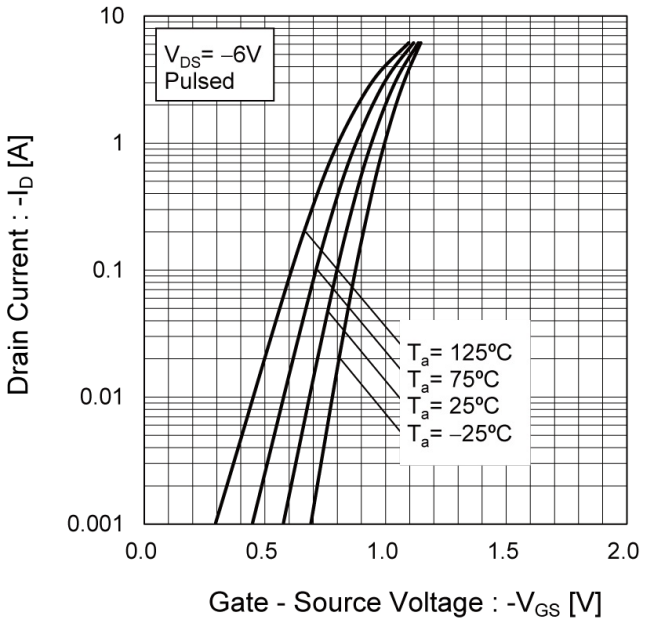


Fig.8 Typical Transfer Characteristics



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●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

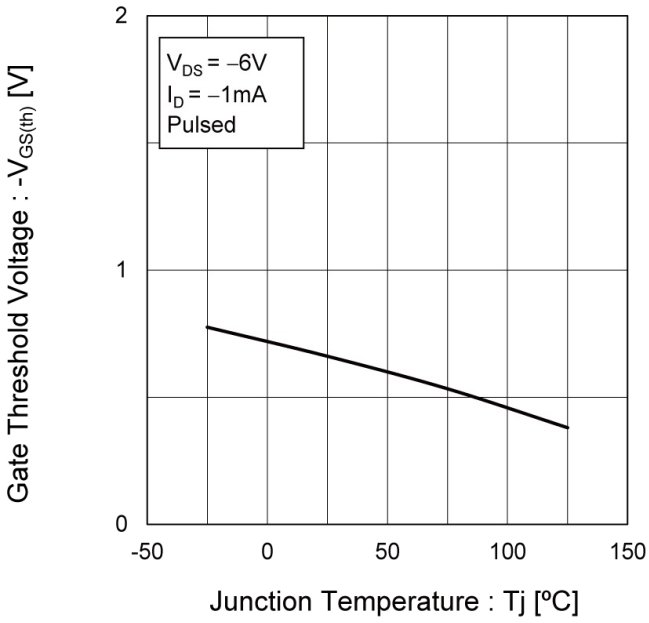


Fig.10 Forward Transfer Admittance vs. Drain Current

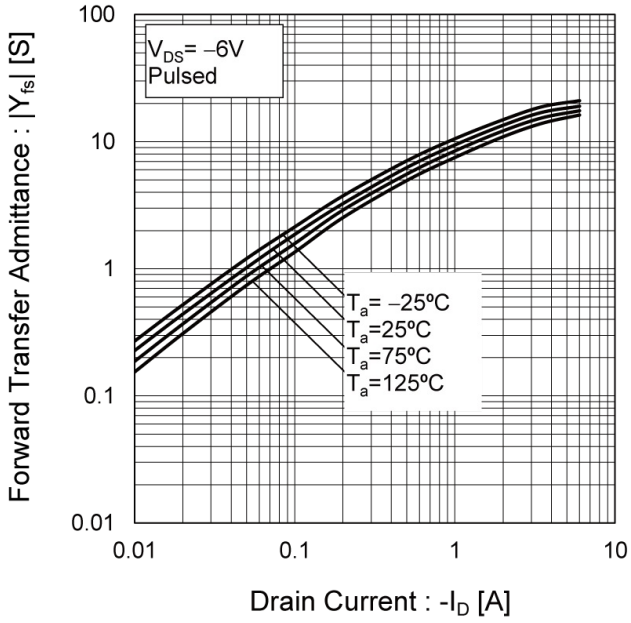


Fig.11 Drain Current Derating Curve

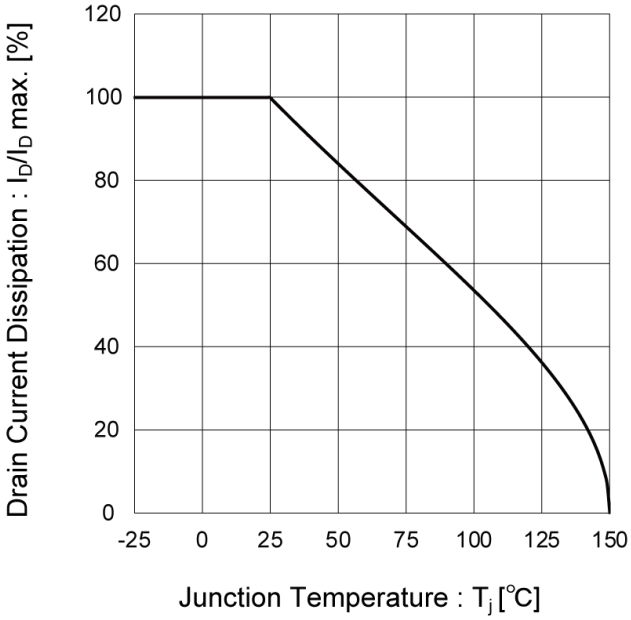
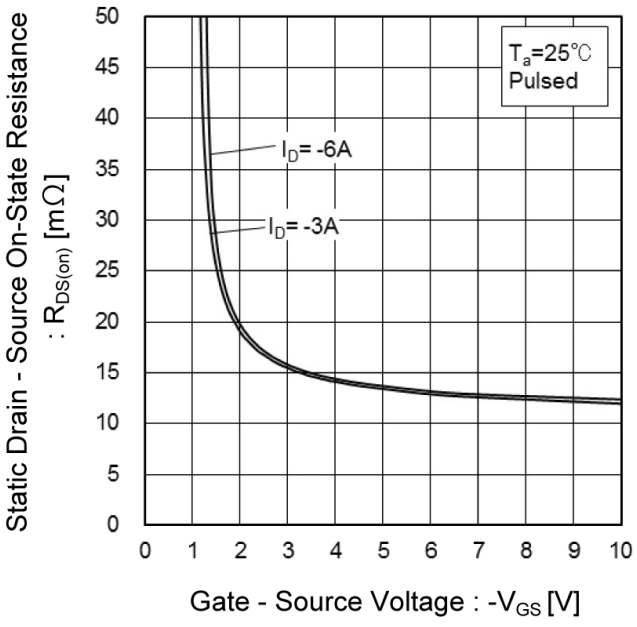


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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●Electrical characteristic curves

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

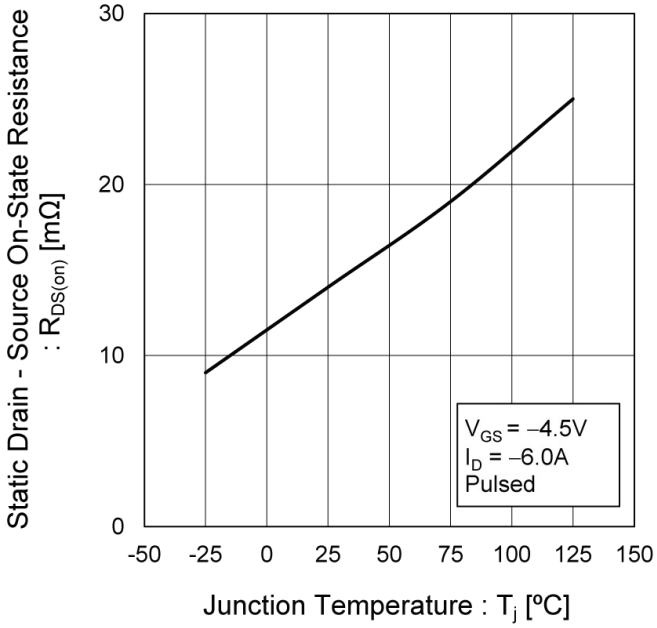
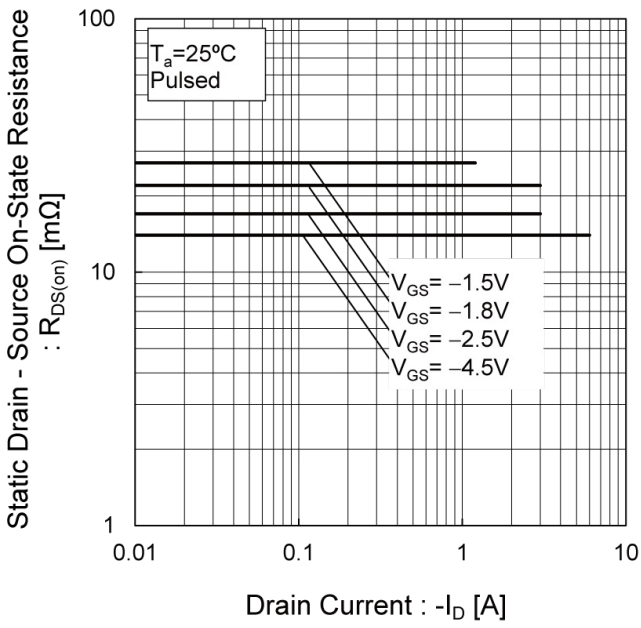


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)



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●Electrical characteristic curves

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

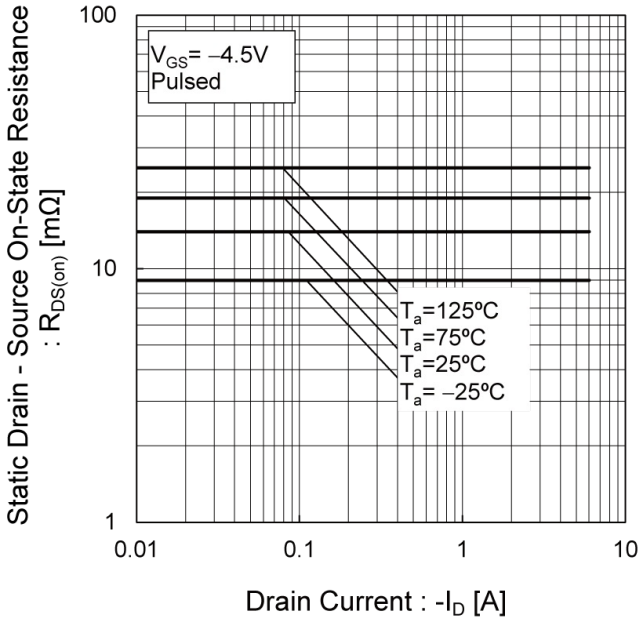


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)

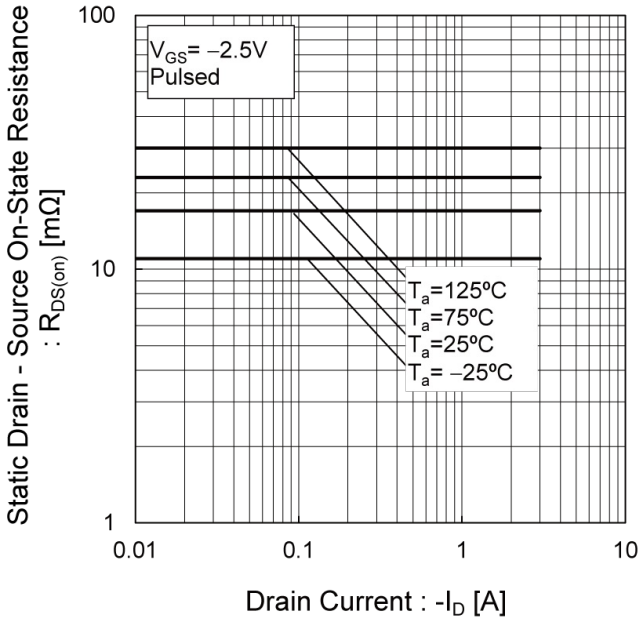


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current (IV)

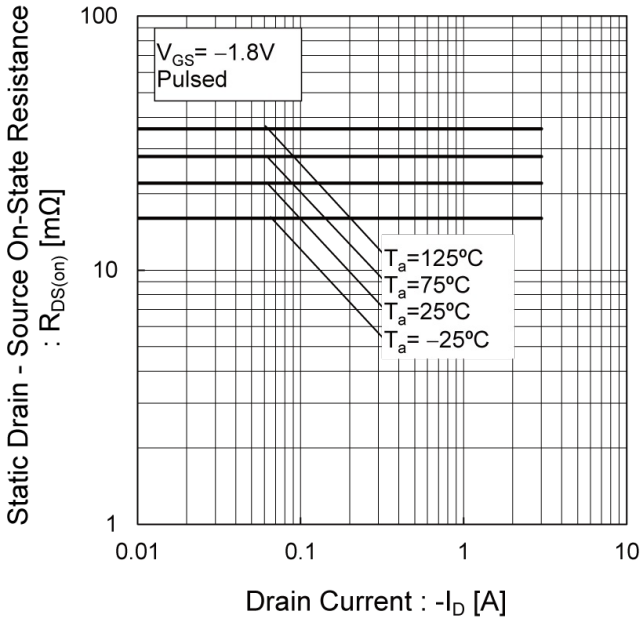
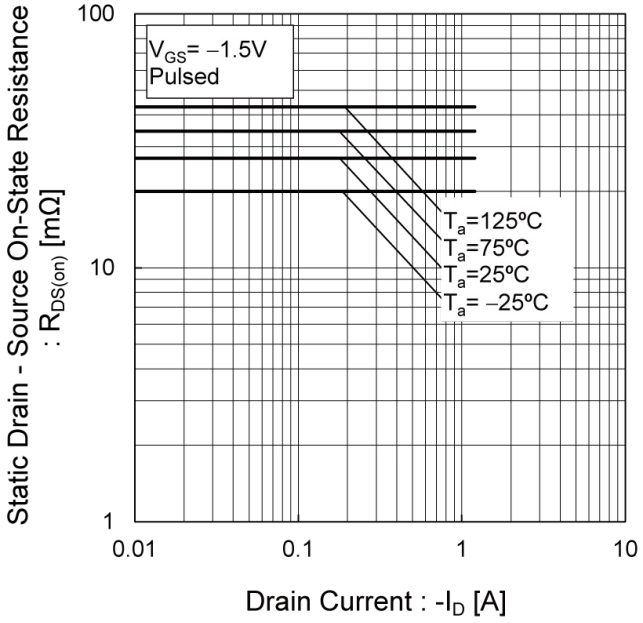


Fig.18 Static Drain - Source On - State Resistance vs. Drain Current (V)



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●Electrical characteristic curves

Fig.19 Typical Capacitance vs. Drain - Source Voltage

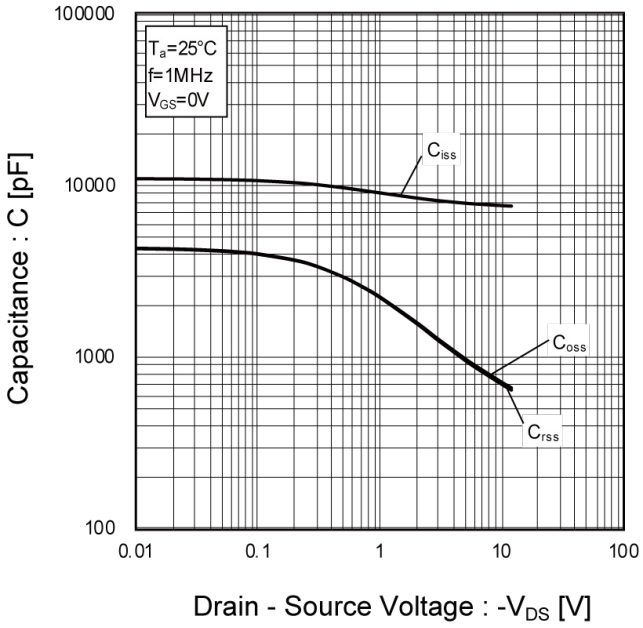


Fig.20 Switching Characteristics

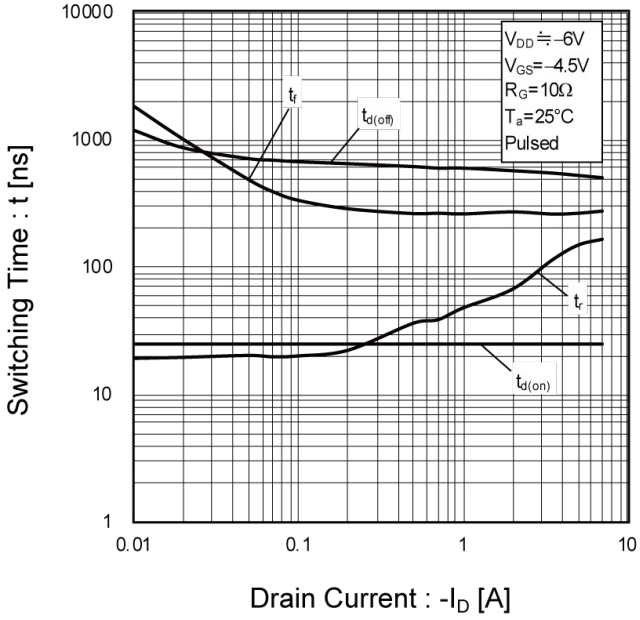


Fig.21 Dynamic Input Characteristics

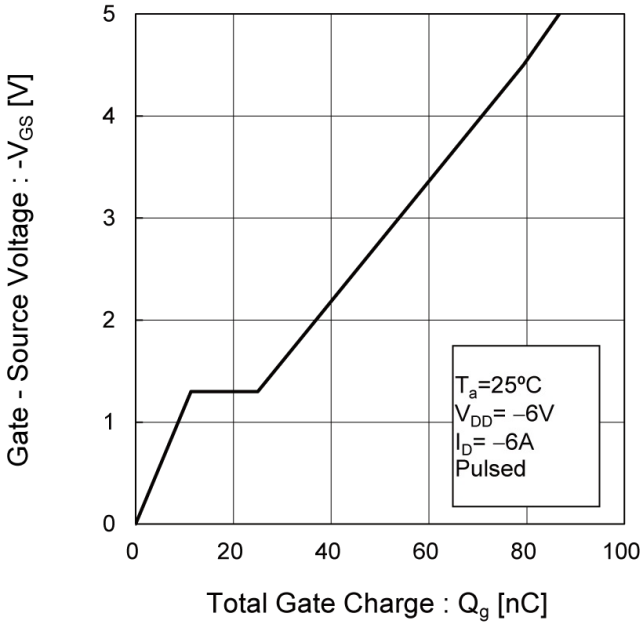
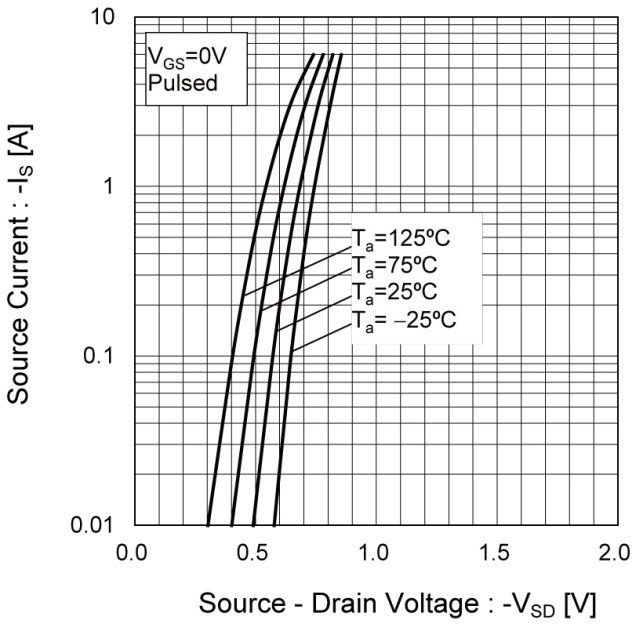


Fig.22 Source Current vs. Source Drain Voltage



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●Measurement circuits

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT

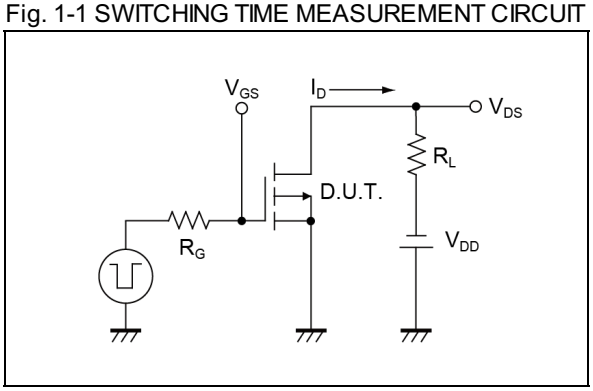


Fig. 1-2 SWITCHING WAVEFORMS

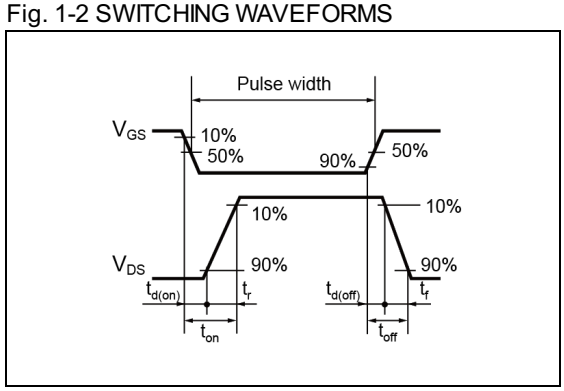


Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

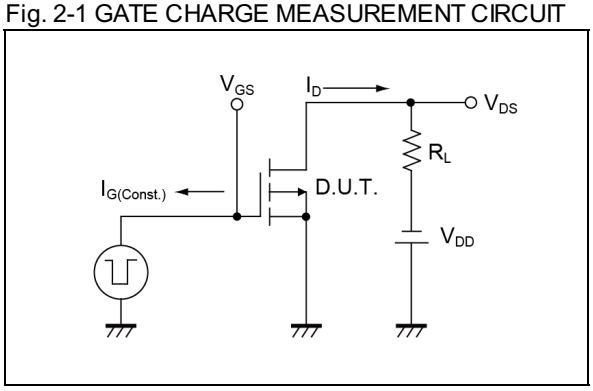
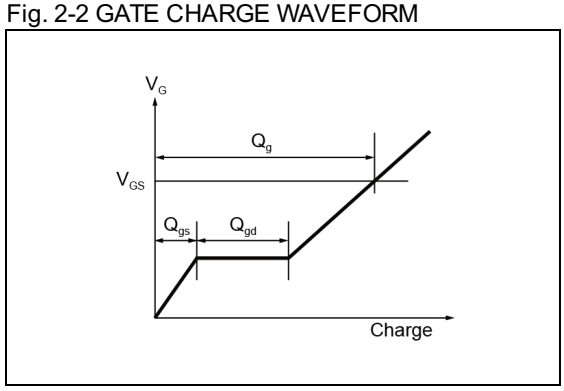


Fig. 2-2 GATE CHARGE WAVEFORM

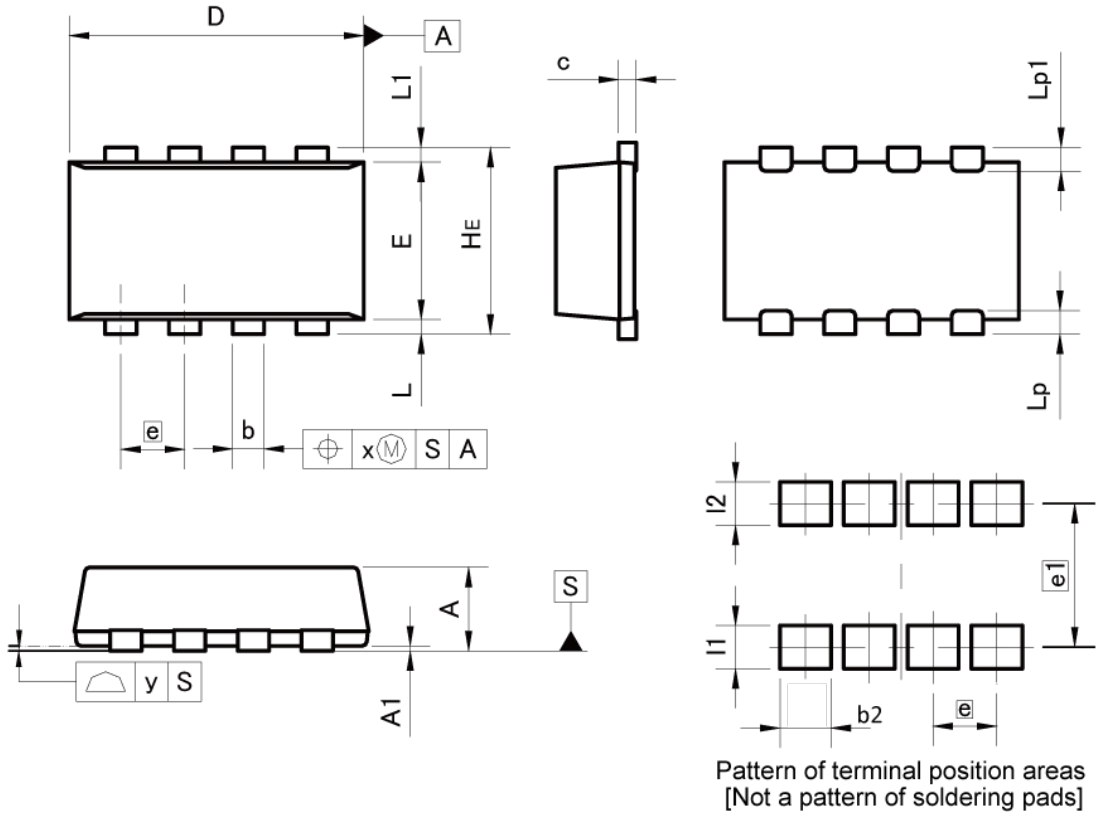


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●Dimensions

TSST8



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.75	0.85	0.030	0.033
A1	0.00	0.05	0.000	0.002
b	0.22	0.42	0.009	0.017
c	0.12	0.22	0.005	0.009
D	2.90	3.10	0.114	0.122
E	1.50	1.70	0.059	0.067
e	0.65		0.026	
HE	1.80	2.00	0.071	0.079
L	0.05	0.25	0.002	0.010
L1	0.05	0.25	0.002	0.010
Lp	0.15	0.34	0.006	0.013
Lp1	0.15	0.34	0.006	0.013
x	−	0.10	−	0.004
y	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	−	0.52	−	0.020
e1	1.46		0.057	
l1	−	0.44	−	0.017
l2	−	0.44	−	0.017

Dimension in mm/inches

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4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

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Distribution Inventory

Part Number	rt1a060ap
Package	TSST8
Unit Quantity	3000
Minimum Package Quantity	3000
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes

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