RF6E045AJ

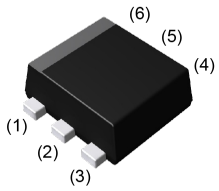
Nch 30V 4.5A Middle Power MOSFET

Datasheet

V_{DSS}	30V
$R_{DS(on)}$(Max.)	23.7mΩ
I_D	±4.5A
P_D	1W

●Outline

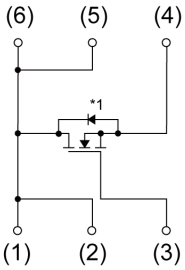
TUMT6



●Inner circuit

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

*1 Body Diode



●Features

1) Low on - resistance.
2) High Power Package (TUMT6).
3) Pb-free lead plating ; RoHS compliant.
4) Halogen Free.

●Application

Switching

●Packaging specifications

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

●Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	30	V
Continuous drain current	I_D	±4.5	A
Pulsed drain current	$I_{D,pulse}$ *1	±18	A
Gate - Source voltage	V_{GSS}	±12	V
Power dissipation	P_D *2	1	W
Junction temperature	T_j	150	℃
Range of storage temperature	T_{stg}	-55 to +150	℃

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *2	-	-	125	℃/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	30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	18	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±12V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1mA	0.5	-	1.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = 1mA referenced to 25℃	-	-2	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *3	V_{GS} = 4.5V, I_D = 4.5A	-	16.9	23.7	mΩ
		V_{GS} = 2.5V, I_D = 4.5A	-	23.9	33.5	
Gate input resistance	R_G	f=1MHz, open drain	-	2.7	-	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$ *3	V_{DS} = 5V, I_D = 4.5A	6	-	-	S

*1 Pw≦10μs , Duty cycle≦1%

*2 Mounted on a ceramic boad (30×30×0.8mm)

*3 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	900	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	100	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	70	-	
Turn - on delay time	$t_{d(on)}$ *3	V_{DD} ≃ 15V, V_{GS} = 4.5V	-	15	-	ns
Rise time	t_r *3	I_D = 2.2A	-	15	-	
Turn - off delay time	$t_{d(off)}$ *3	R_L ≃ 6.8Ω	-	40	-	
Fall time	t_f *3	R_G = 10Ω	-	10	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *3	V_{DD} ≃ 15V, I_D = 4.5A, V_{GS} = 4.5V	-	8.1	-	nC
Gate - Source charge	Q_{gs} *3		-	2.1	-	
Gate - Drain charge	Q_{gd} *3		-	2.0	-	

●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	-	-	0.8	A
Body diode pulse current	I_{SP} *1		-	-	18	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 0.8A	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

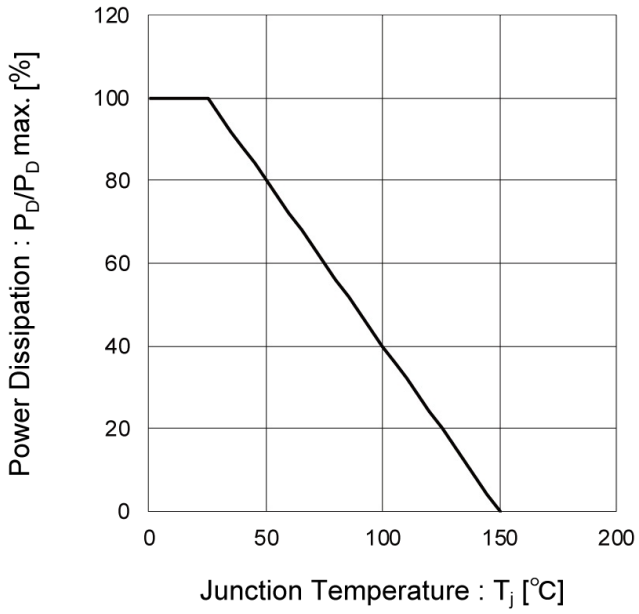


Fig.2 Maximum Safe Operating Area

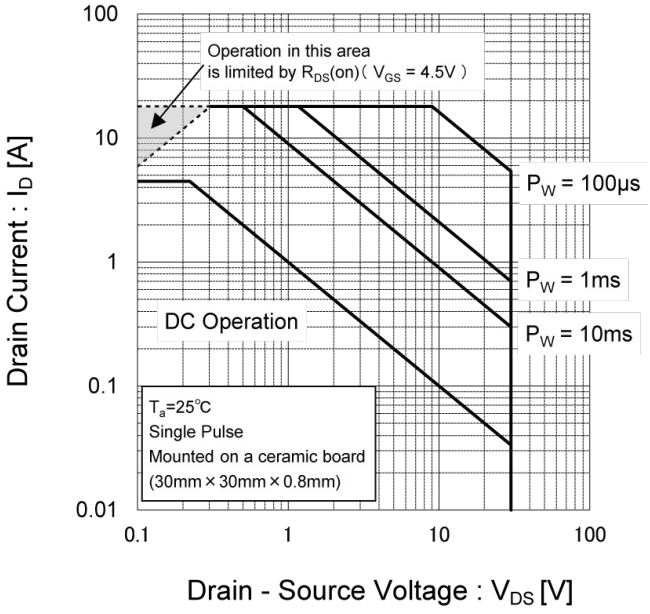


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

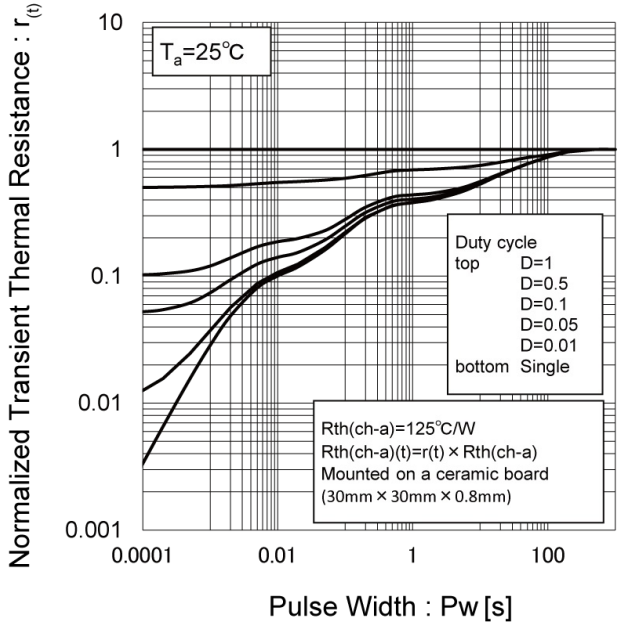
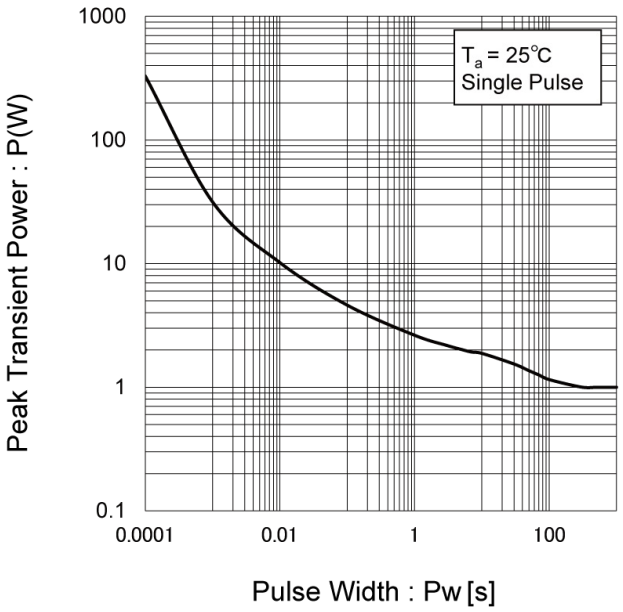


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

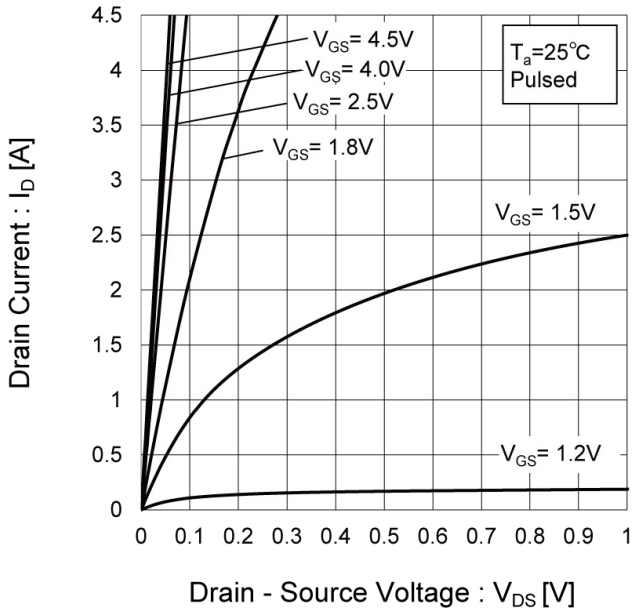


Fig.6 Typical Output Characteristics(II)

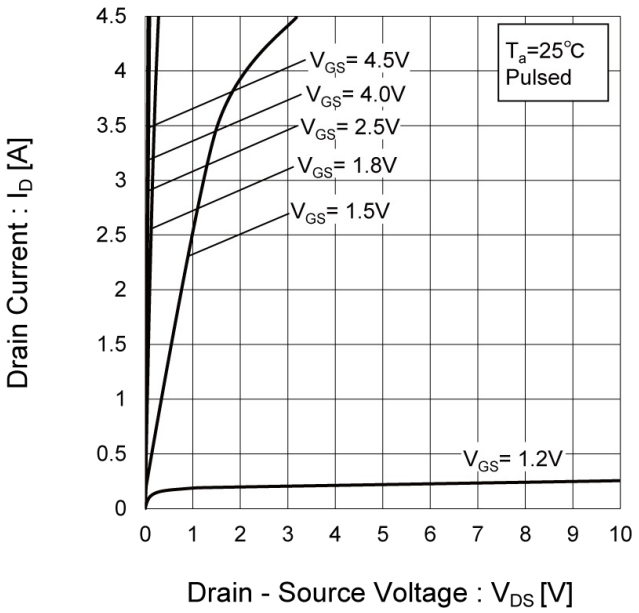
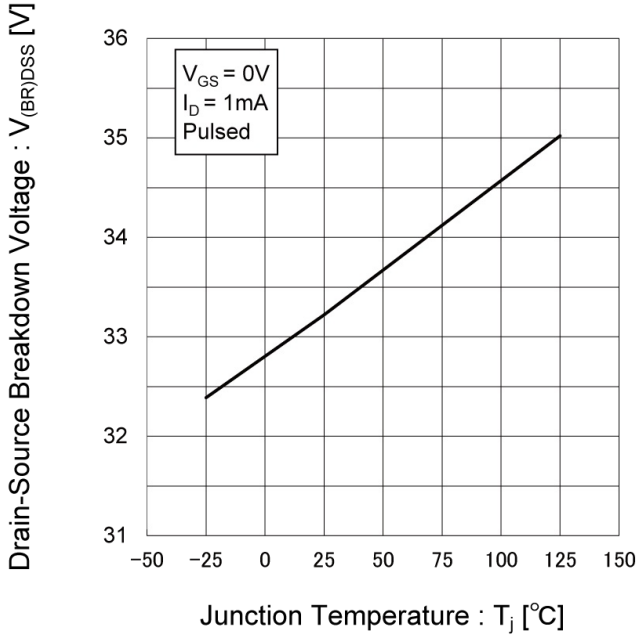


Fig.7 Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

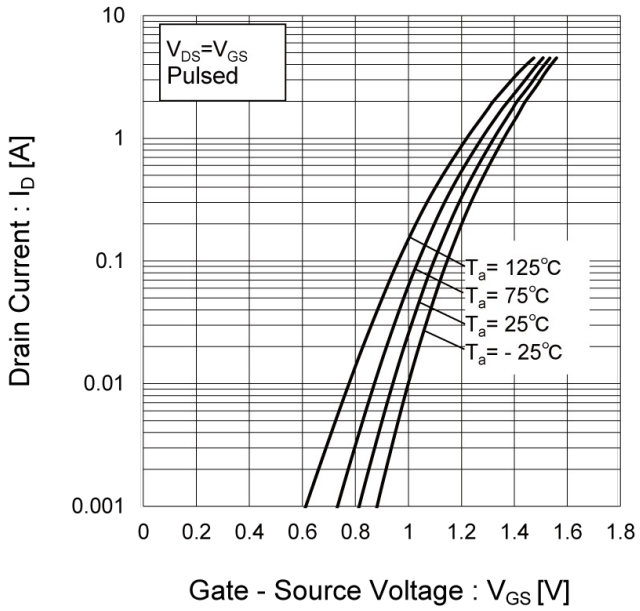


Fig.9 Gate Threshold Voltage vs. Junction Temperature

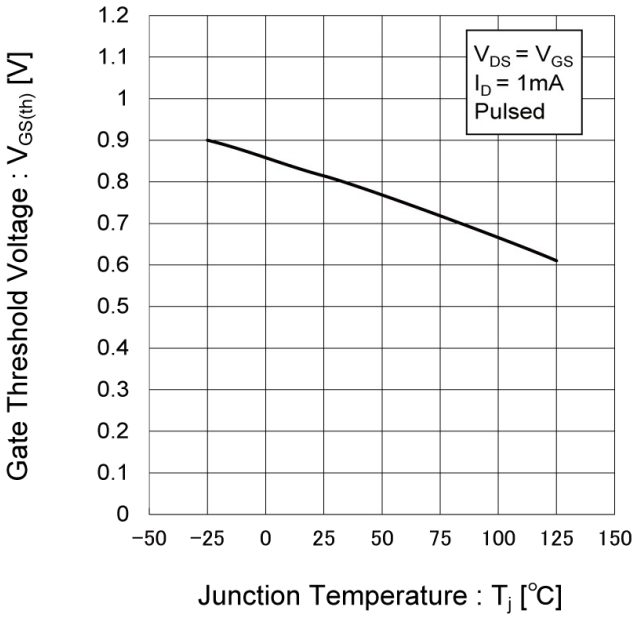
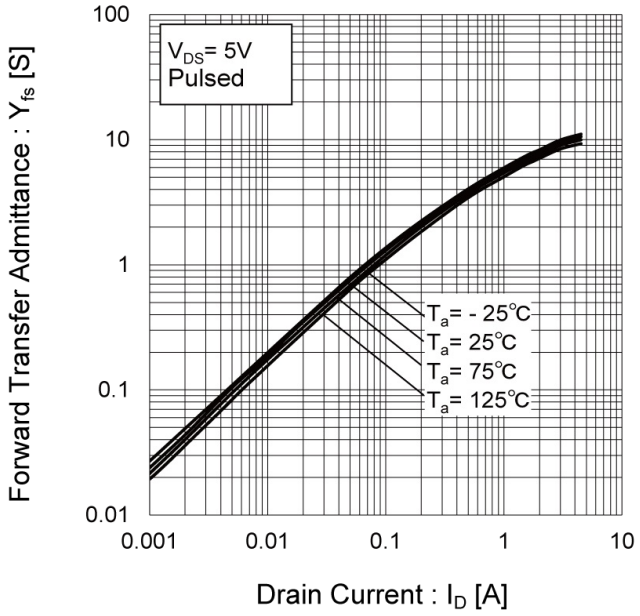


Fig.10 Tranceconductance vs. Drain Current



●Electrical characteristic curves

Fig.11 Drain Current Derating Curve

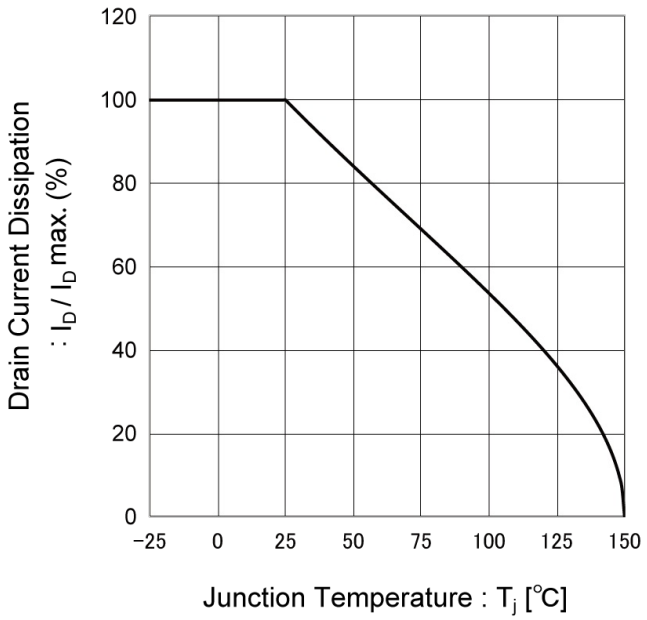


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

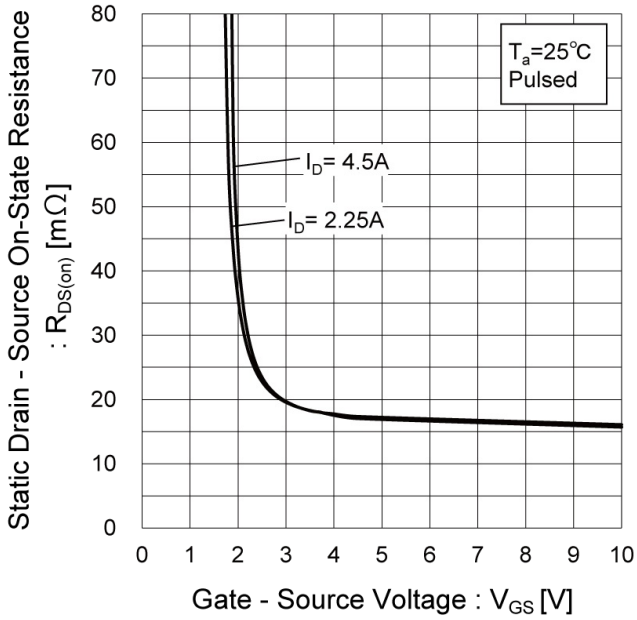
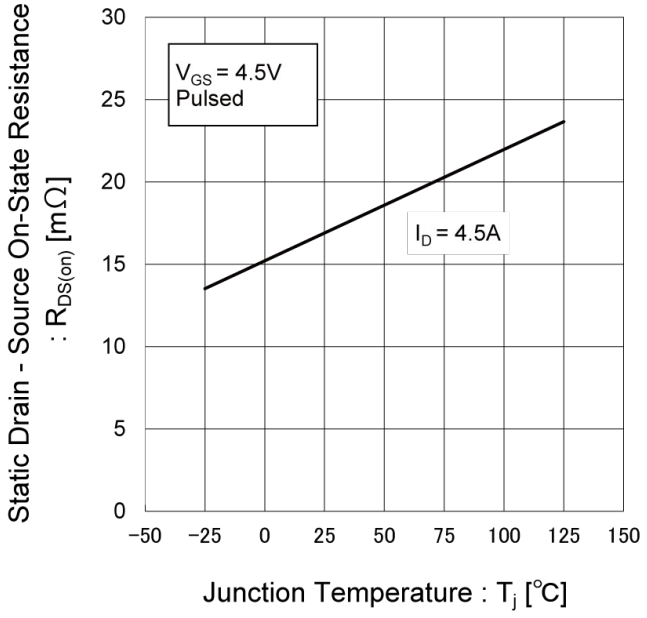


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

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

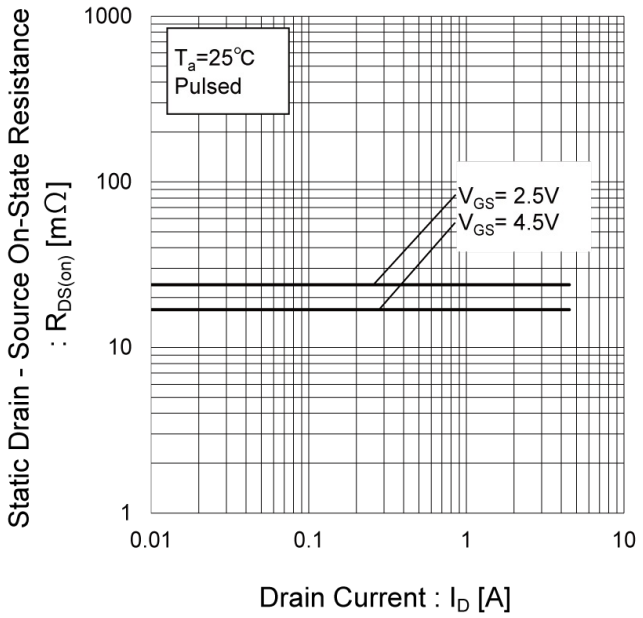


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

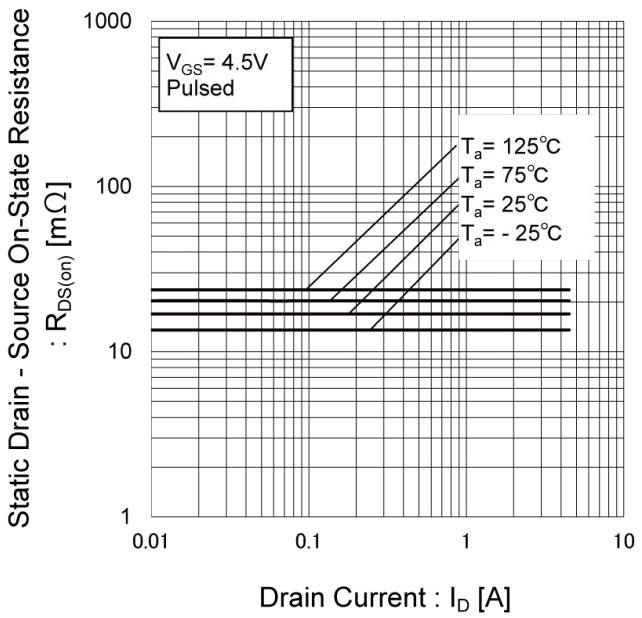
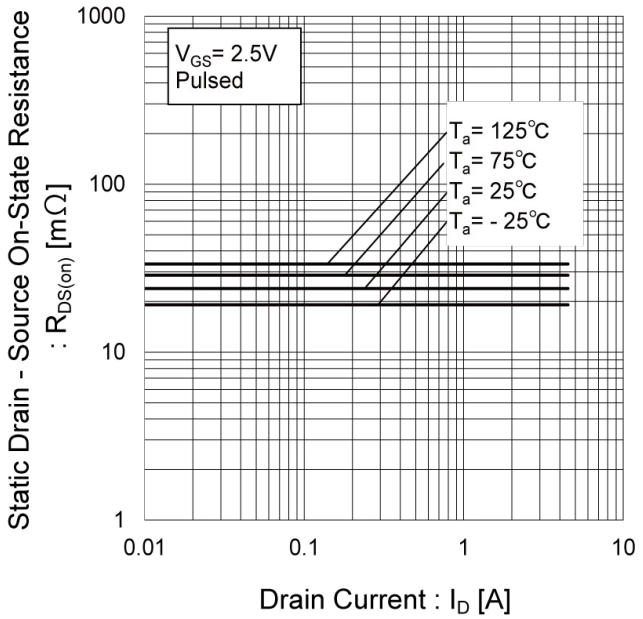


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

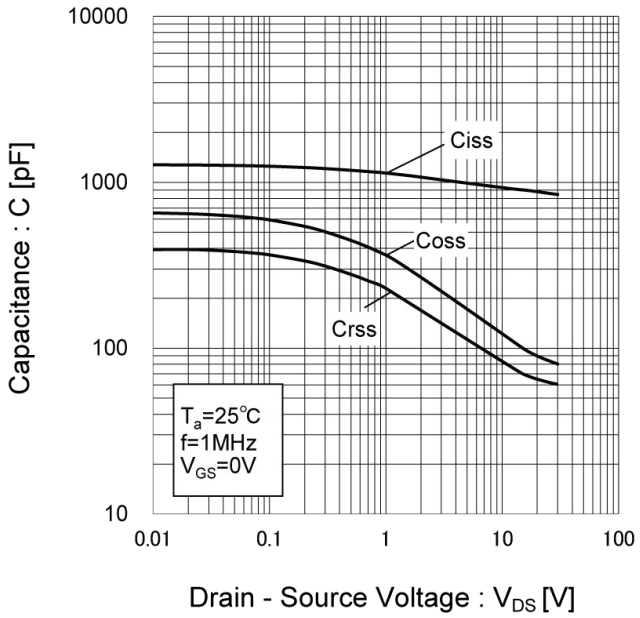


Fig.18 Switching Characteristics

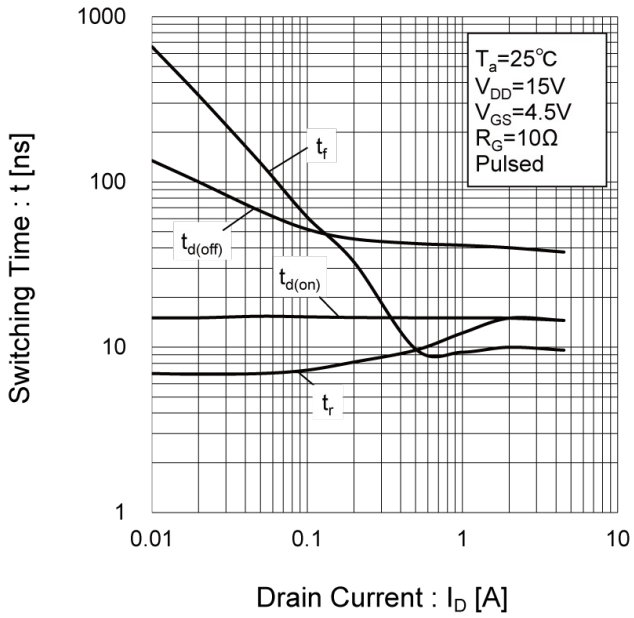


Fig.19 Dynamic Input Characteristics

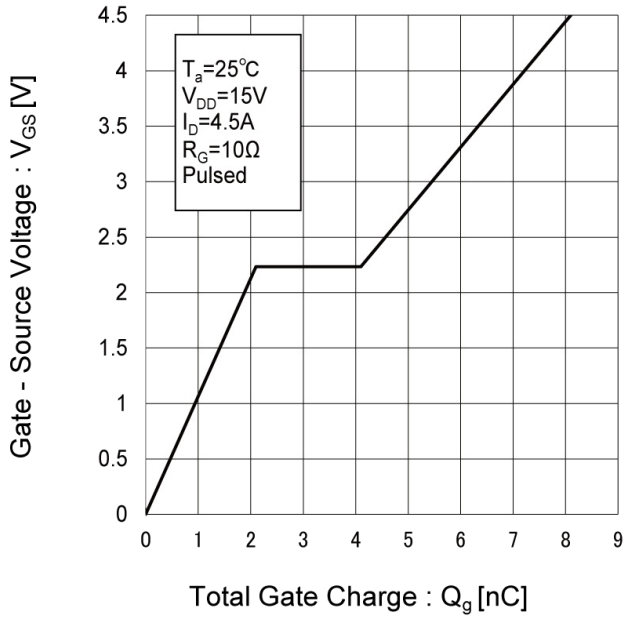
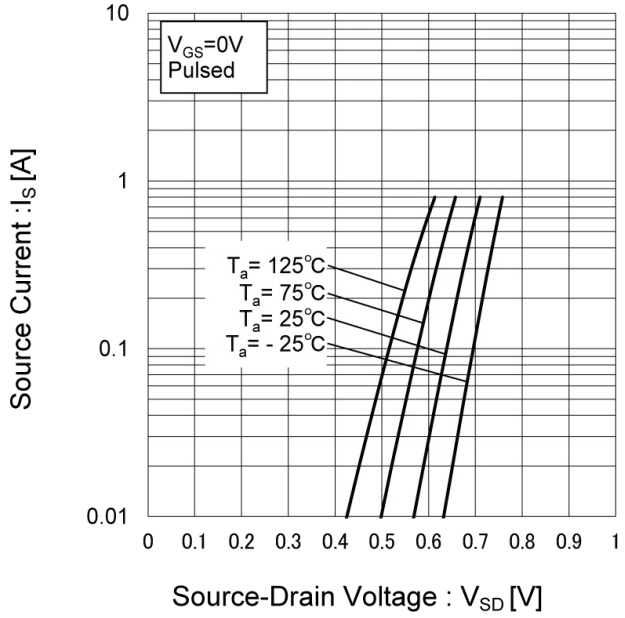


Fig.20 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

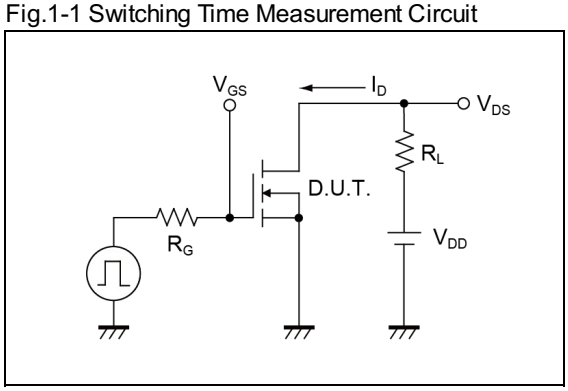


Fig.1-2 Switching Waveforms

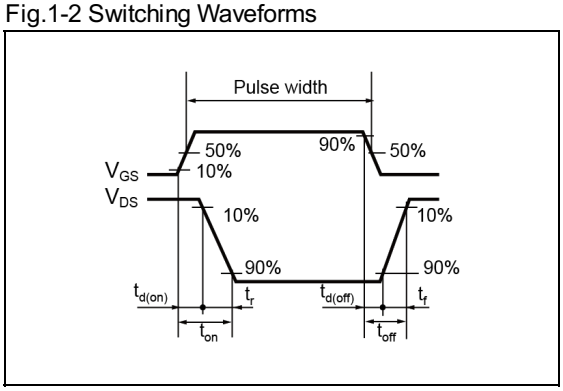


Fig.2-1 Gate Charge Measurement Circuit

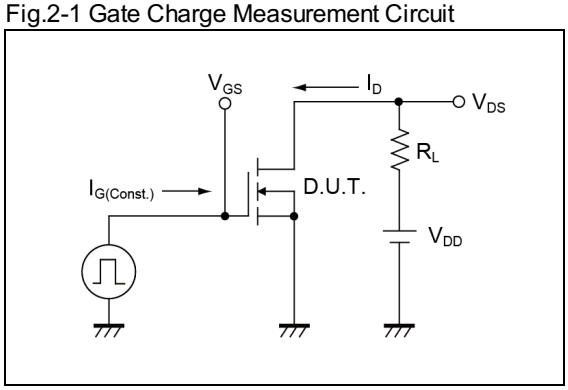
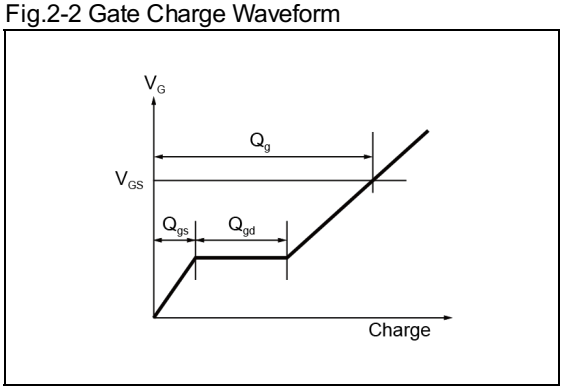


Fig.2-2 Gate Charge Waveform

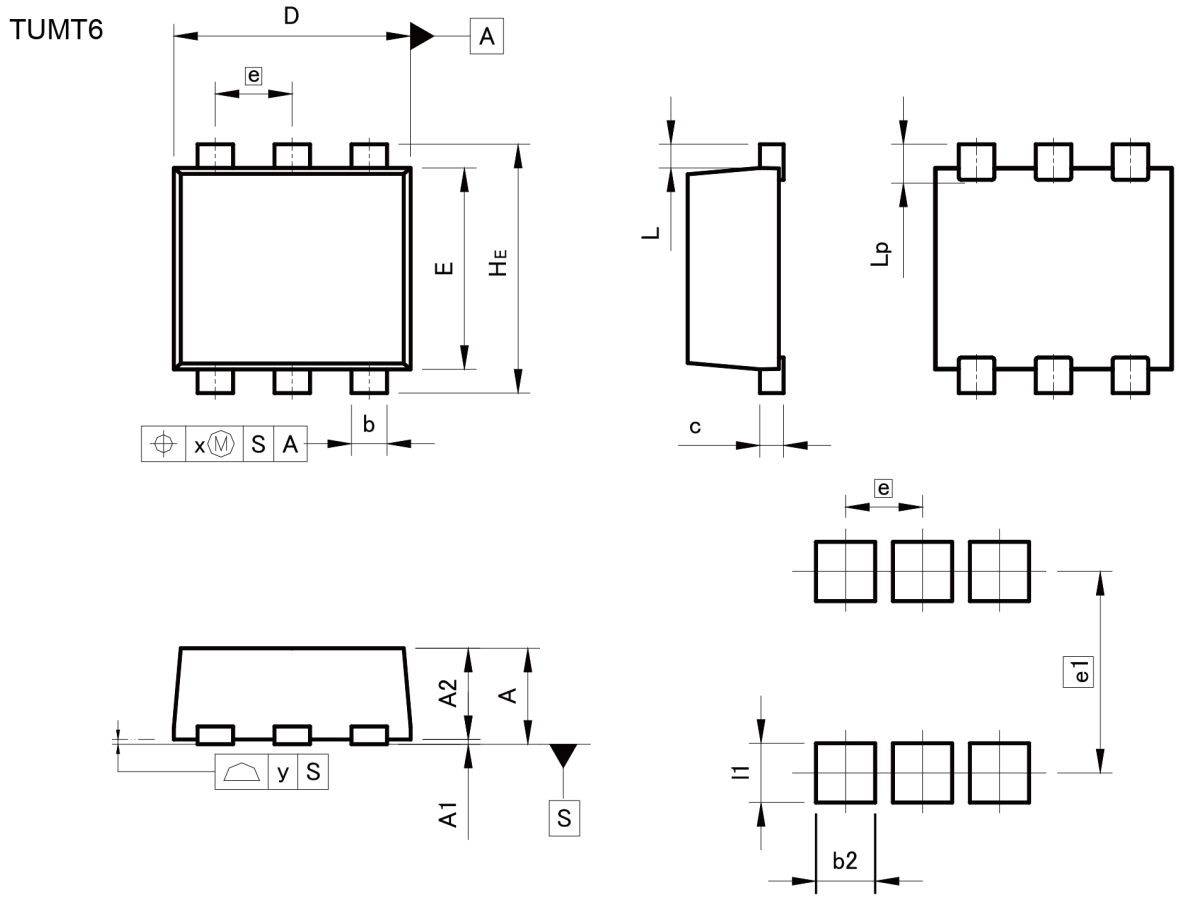


●Notice

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

●Dimensions

TUMT6



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

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	−	0.85	−	0.033
A1	0.00	0.10	0.000	0.004
A2	0.72	0.82	0.028	0.032
b	0.25	0.40	0.010	0.016
c	0.12	0.22	0.005	0.009
D	1.90	2.10	0.075	0.083
E	1.60	1.80	0.063	0.071
e	0.65		0.026	
HE	2.00	2.20	0.079	0.087
L	0.20		0.008	
Lp	−	0.40	−	0.016
x	−	0.10	−	0.004
y	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	−	0.50	−	0.020
e1	1.70		0.067	
l1	−	0.50	−	0.020

Dimension in mm/inches

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