RS7E200BG

Nch 30V 390A Power MOSFET

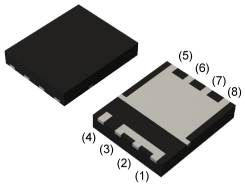
Datasheet

V_{DSS}	30V
$R_{DS(on)}$(Max.)	0.67mΩ
I_D	±390A
P_D	180W

●Outline

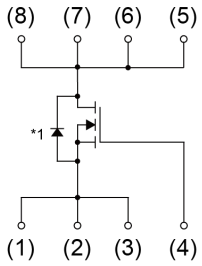
DFN5060-8S

DFN5060T8LSHAAE



●Inner circuit

(1) Source
(2) Source
(3) Source
(4) Gate
(5) Drain
(6) Drain
(7) Drain
(8) Drain
*1 Body Diode



●Features

1) Low on - resistance
2) High power package (DFN5060T8LSHAAE)
3) Pb-free plating ; RoHS compliant
4) Halogen free
5) 100% Rg and UIS tested

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	300
	Tape width (mm)	12
	Quantity (pcs)	2500
	Taping code	TB1
	Marking	RS7E200BG

●Application

Switching
Motor drives
DC/DC converter

●Absolute maximum ratings (T_a = 25°C ,unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	30	V
Continuous drain current	Silicon limit (V_{GS}=10V)	I_D*1	±390	A
	T_c = 25°C (V_{GS}=10V)	I_D*2	±200	A
Pulsed drain current		I_{DP}*3	±900	A
Gate - Source voltage		V_{GSS}	±20	V
Avalanche current, single pulse		I_{AS}*4	30	A
Avalanche energy, single pulse		E_{AS}*4	637	mJ
Power dissipation		P_D*2	180	W
		P_D*5	3.0	W
Junction temperature		T_j	150	℃
Operating junction and storage temperature range		T_{stg}	-55 to +150	℃

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC} *2	-	-	0.69	℃/W
Thermal resistance, junction - ambient	R_{thJA} *5	-	-	41.7	℃/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℃	-	25.8	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	5	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±500	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, 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℃	-	-4.5	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *6	V_{GS} = 10V, I_D = 50A	-	0.53	0.67	mΩ
		V_{GS} = 4.5V, I_D = 50A	-	0.75	1.06	
Gate resistance	R_G	-	-	0.6	-	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$ *6	V_{DS} = 5V, I_D = 50A	70	-	-	S

*1 Limited by silicon chip capability.

*2 T_c=25℃, Limited only by maximum temperature allowed.

*3 Pw ≤ 10μs , Duty cycle ≤ 1%

*4 L ≃ 1mH, V_{DD} = 15V, R_G = 25Ω, Starting T_j = 25℃ Fig.3-1,3-2

*5 Mounted on a Cu board (40×40×0.8mm)

*6 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	9500	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	4390	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	550	-	
Turn - on delay time	$t_{d(on)}$ *6	V_{DD} ≃ 15V,V_{GS} = 10V	-	49	-	ns
Rise time	t_r *6	I_D = 50A	-	40	-	
Turn - off delay time	$t_{d(off)}$ *6	R_L ≃ 0.3Ω	-	220	-	
Fall time	t_f *6	R_G = 10Ω	-	155	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g *6	V_{DD} ≃ 15V I_D = 50A	V_{GS} = 10V	-	135.0	-	nC
			V_{GS} = 4.5V	-	60.0	-	
Gate - Source charge	Q_{gs} *6			-	25.0	-	
Gate - Drain charge	Q_{gd} *6			-	14.2	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S *2	-	-	-	150	A
Pulse forward current	I_{SP} *3		-	-	900	A
Forward voltage	V_{SD} *6	V_{GS} = 0V, I_S = 50A	-	-	1.2	V
Reverse recovery time	t_{rr} *6	I_S = 50A, V_{GS}=0V di/dt = 100A/μs	-	86	-	ns
Reverse recovery charge	Q_{rr} *6		-	50	-	nC

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

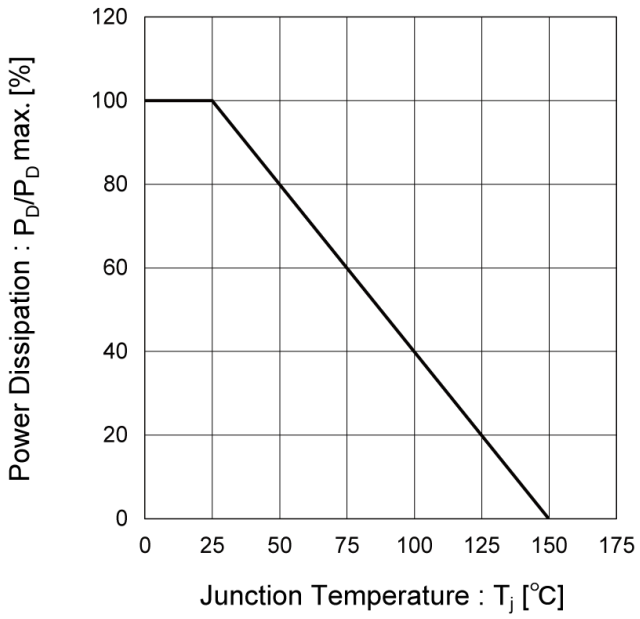


Fig.2 Maximum Safe Operating Area

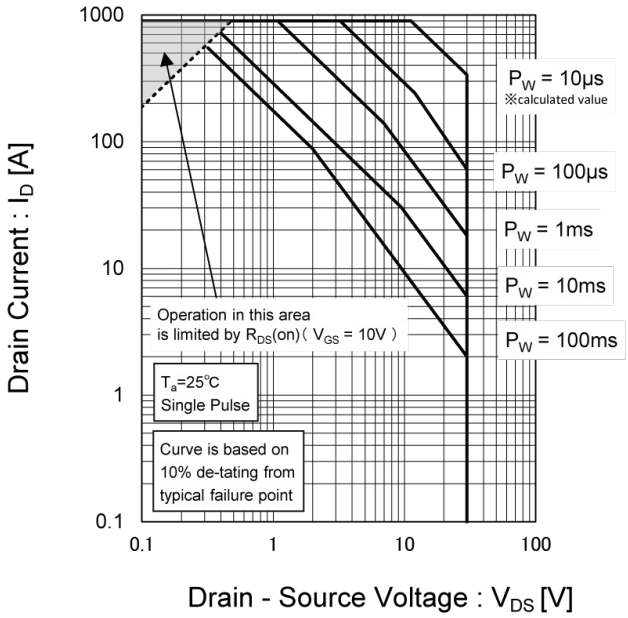


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

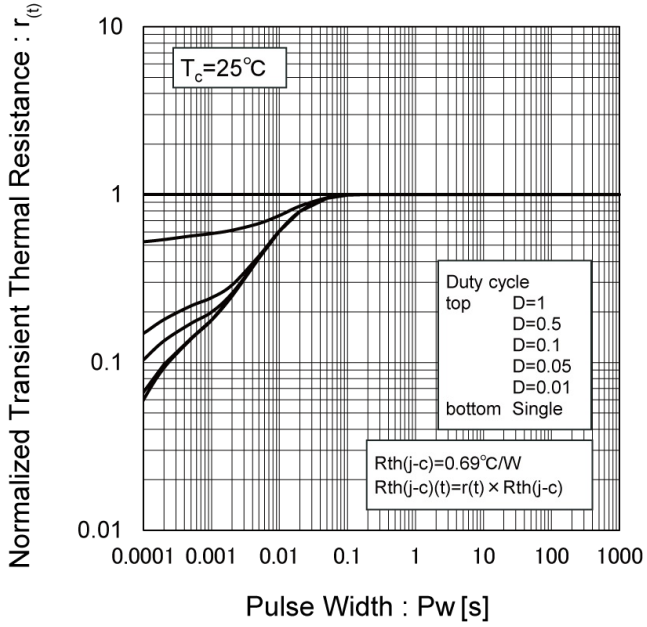
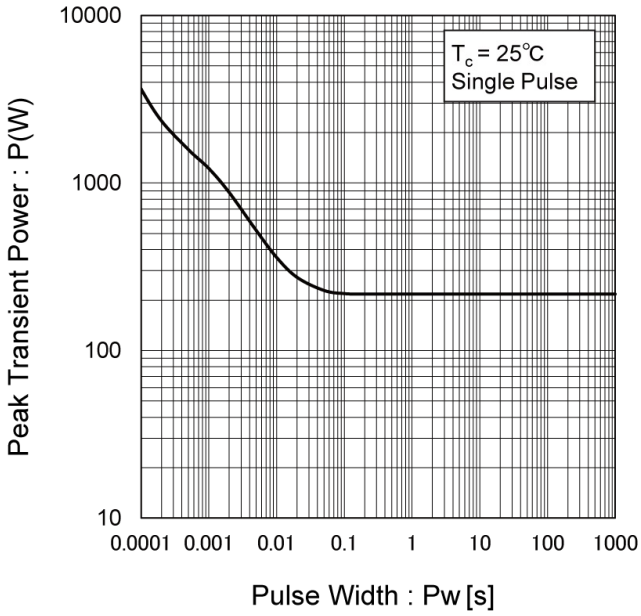


Fig.4 Single Pulse Maximum Power Dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

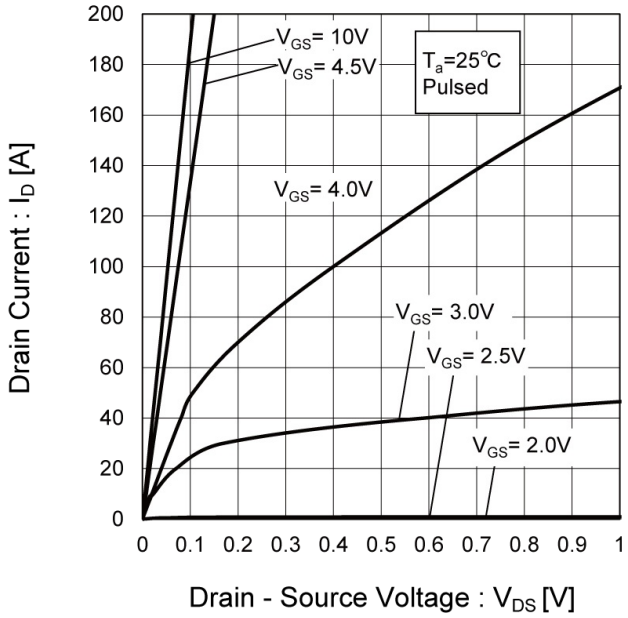


Fig.6 Typical Output Characteristics(II)

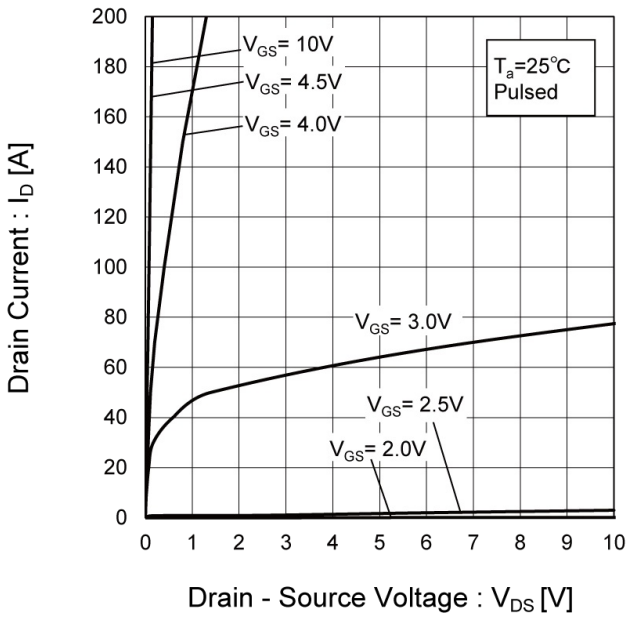


Fig.7 Breakdown Voltage vs. Junction Temperature

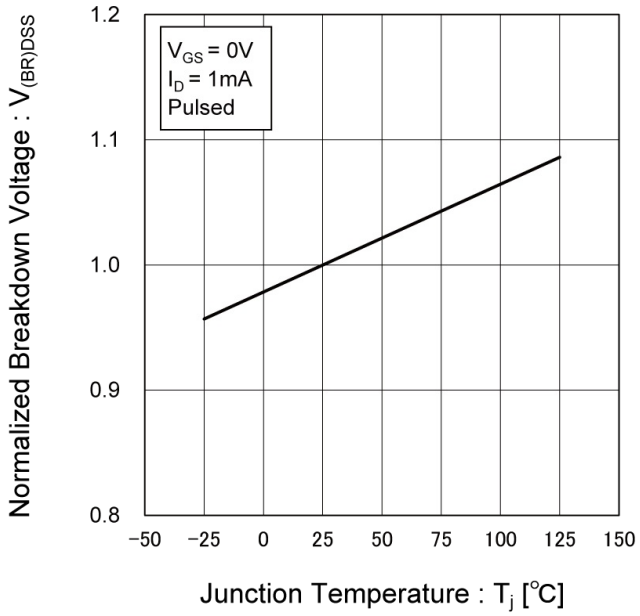
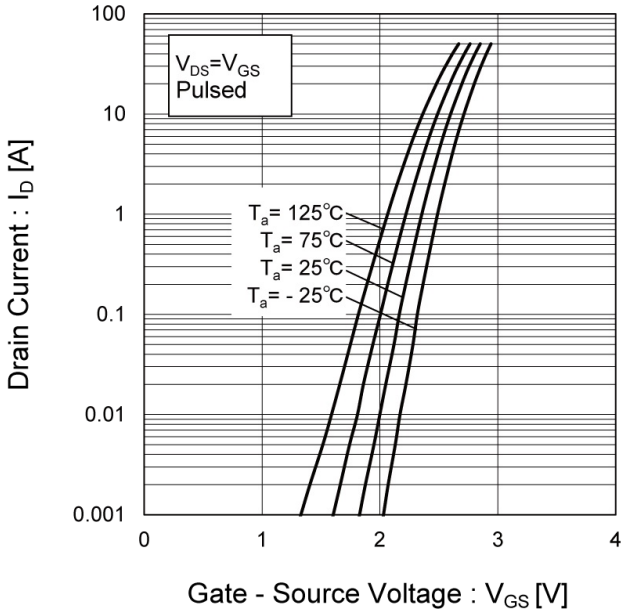


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

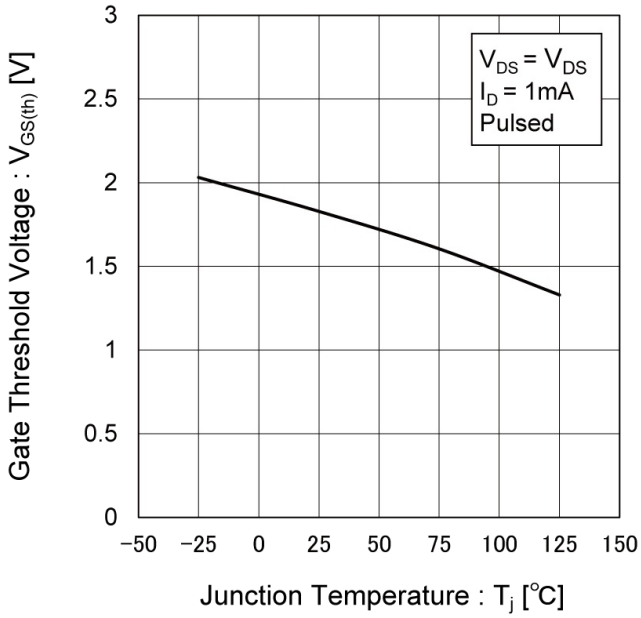


Fig.10 Forward Transfer Admittance vs. Drain Current

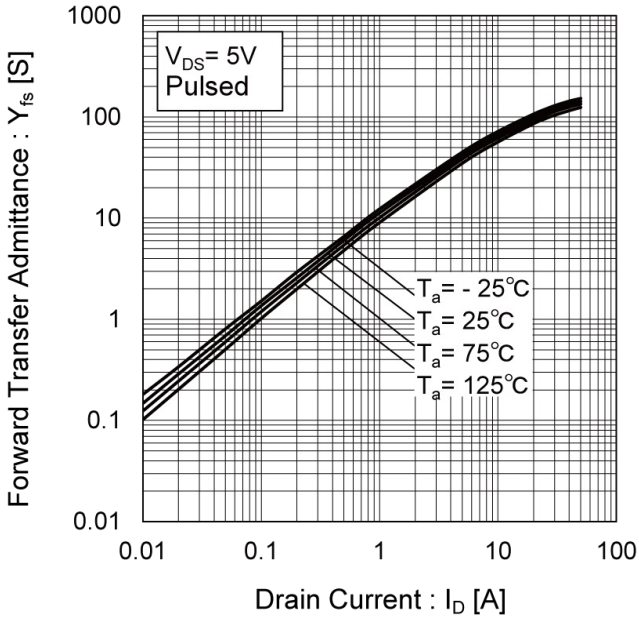


Fig.11 Drain Current Derating Curve

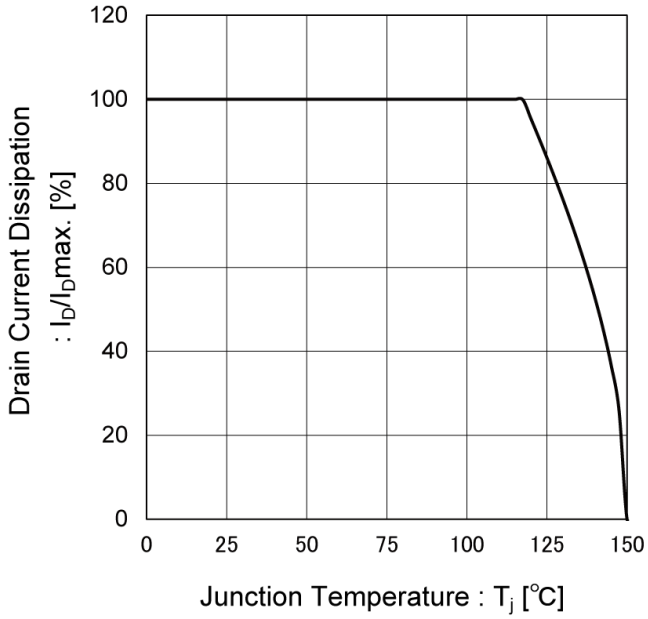
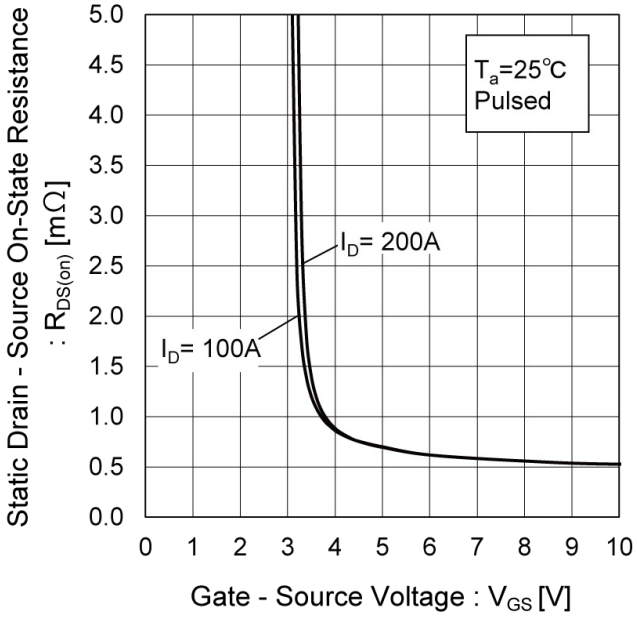


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

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

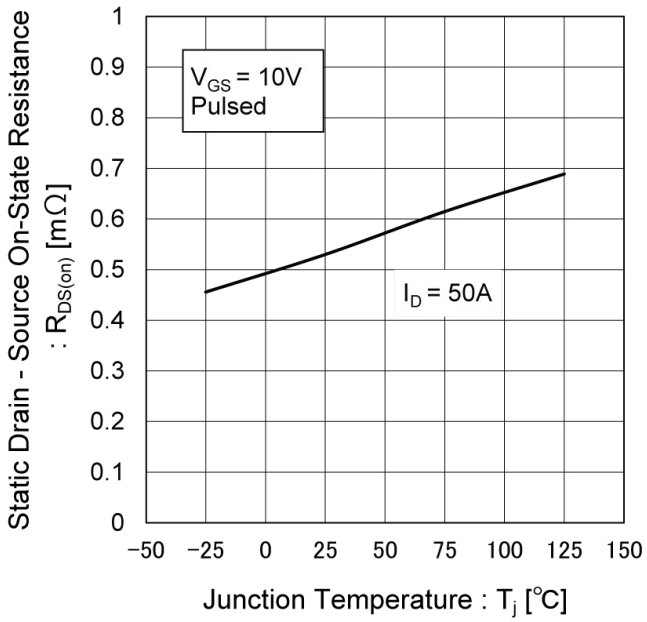


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current (I)

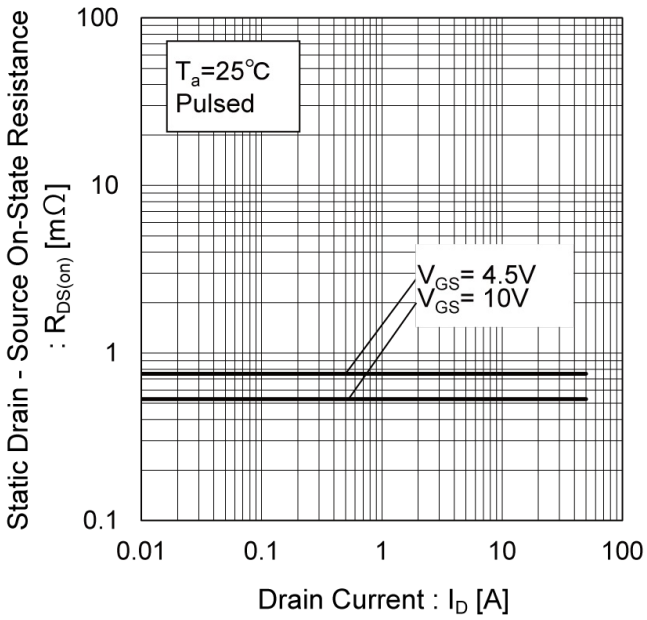


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)

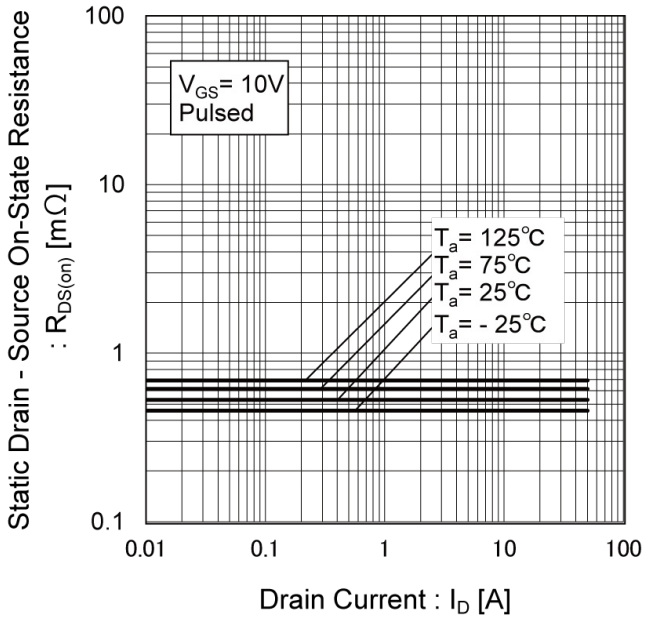
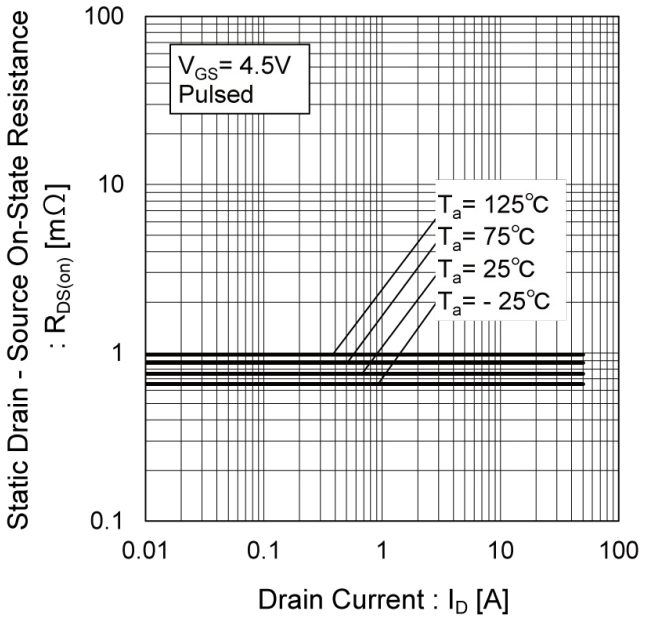


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)



●Electrical characteristic curves

Fig.17 Typical Capacitances vs. Drain - Source Voltage

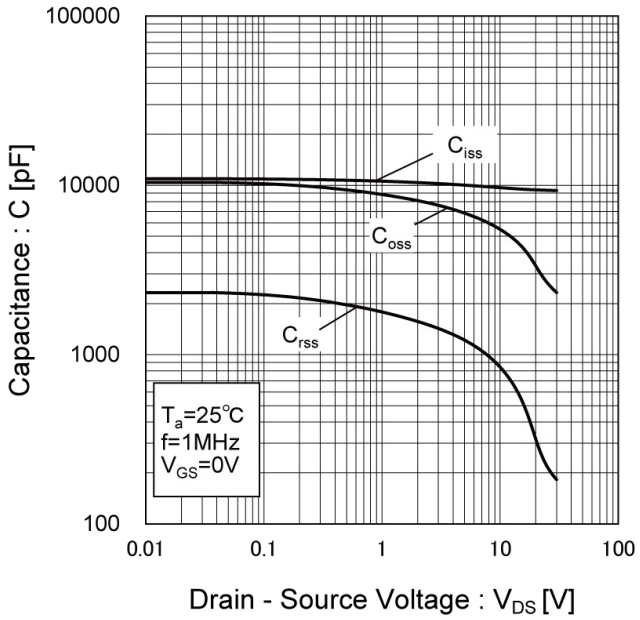


Fig.18 Switching Characteristics

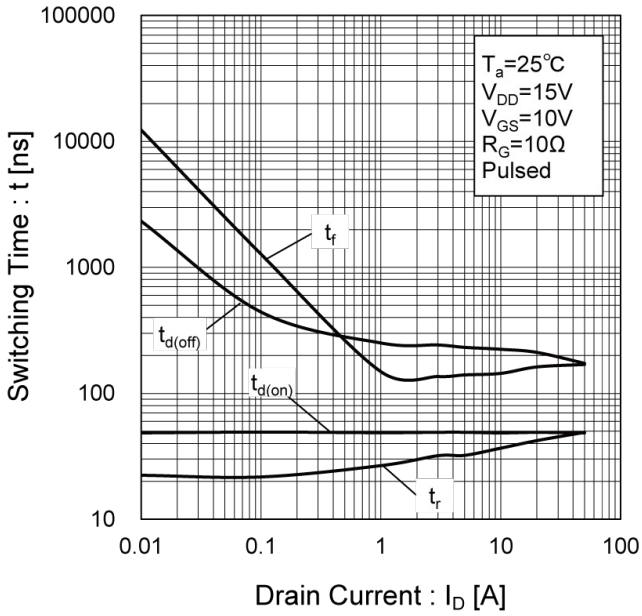


Fig.19 Typical Gate Charge

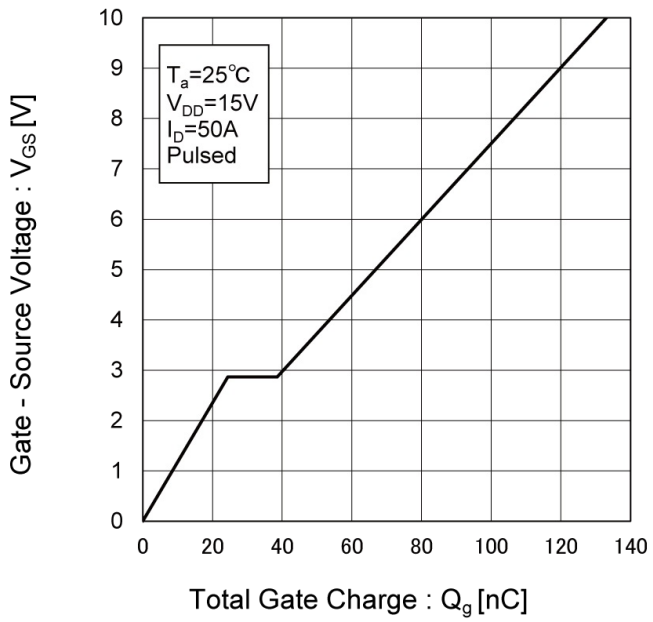
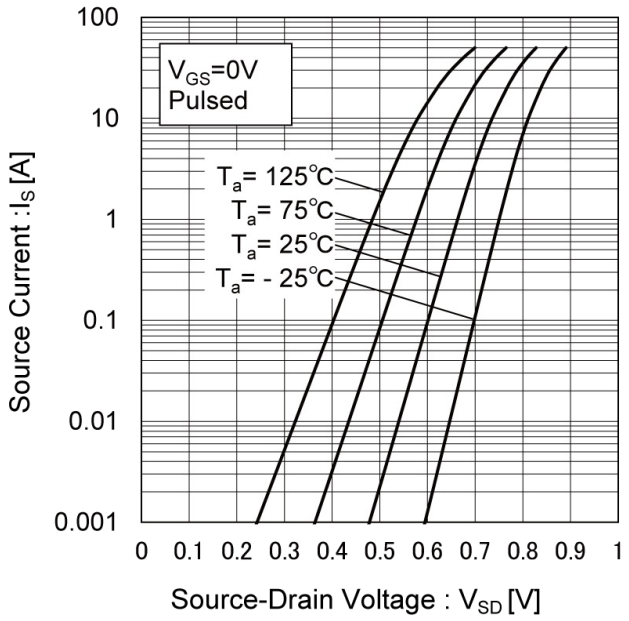


Fig.20 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

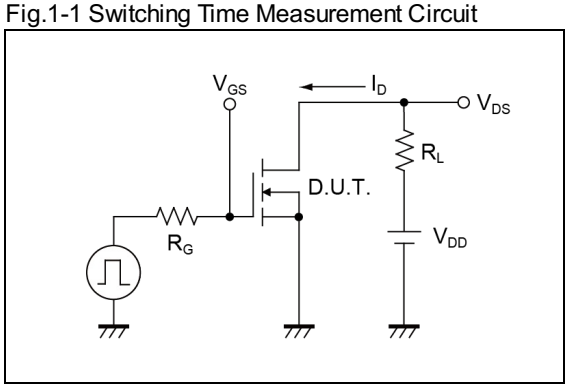


Fig.1-2 Switching Waveforms

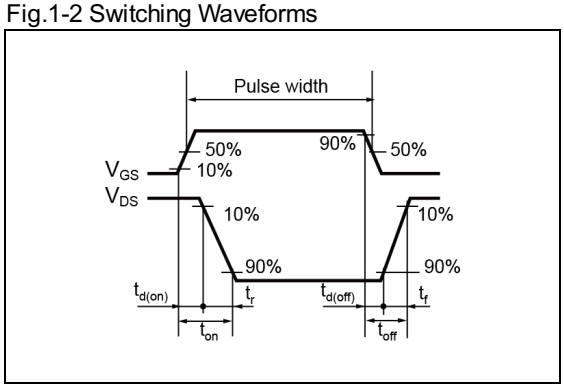


Fig.2-1 Gate Charge Measurement Circuit

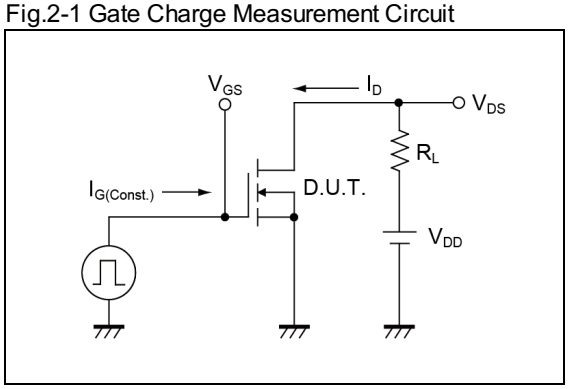


Fig.2-2 Gate Charge Waveform

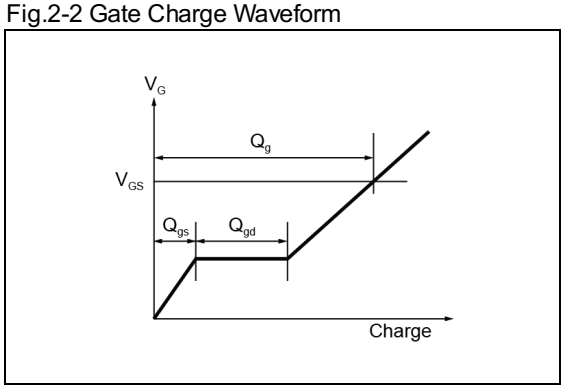


Fig.3-1 Avalanche Measurement Circuit

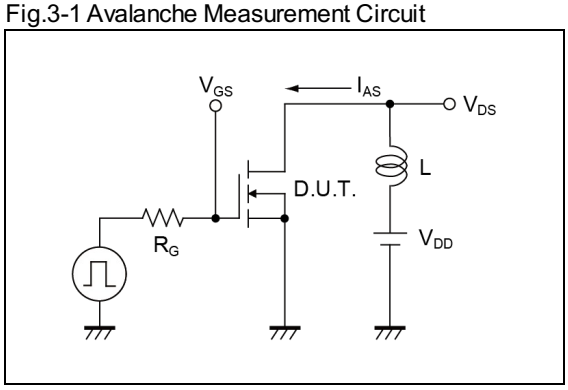
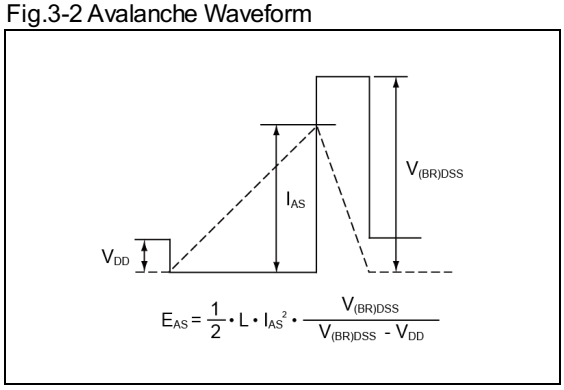


Fig.3-2 Avalanche Waveform



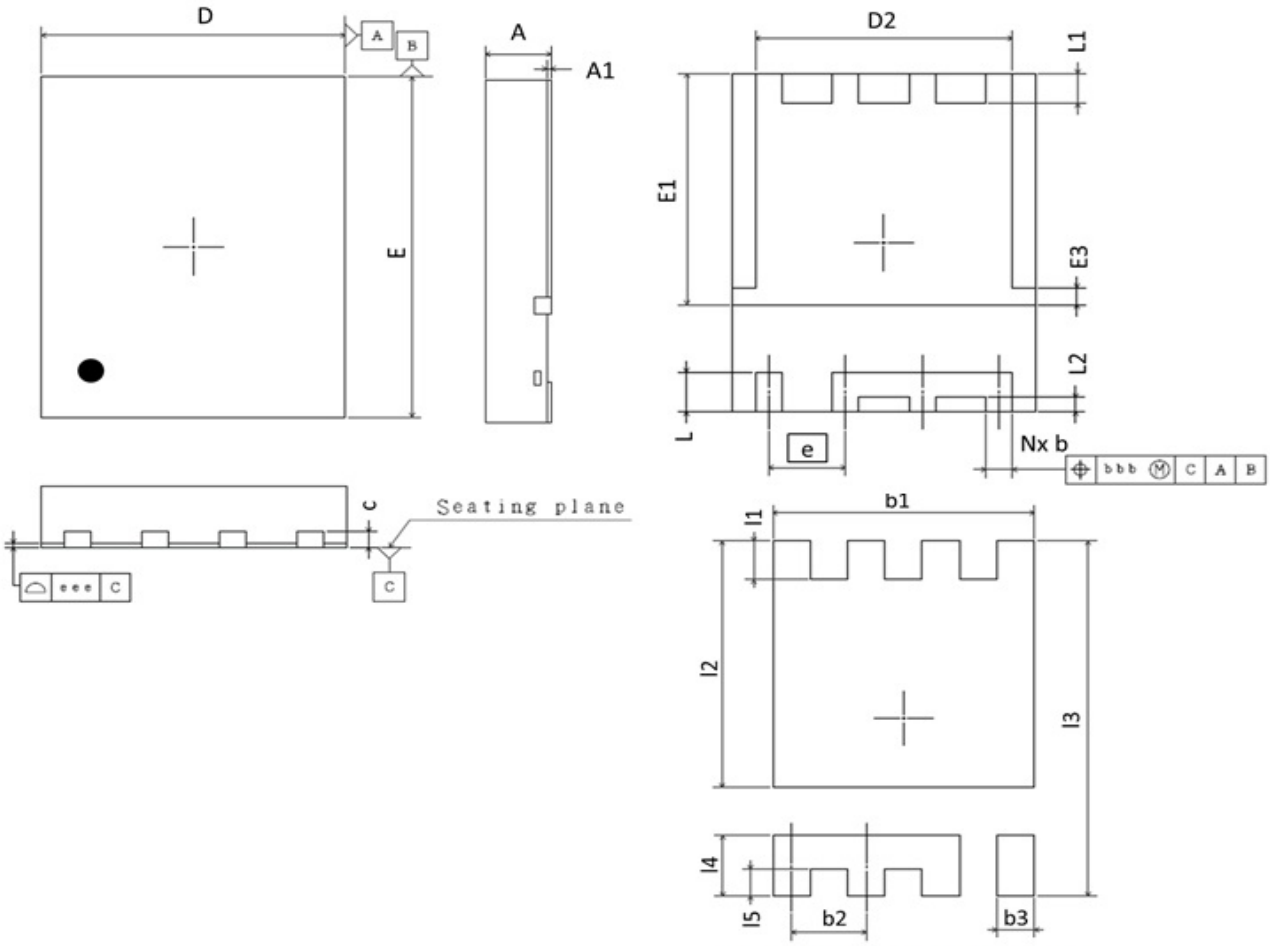
●Notice

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

●Dimensions

DFN5060-8S

DFN5060T8LSHAAE



[reference pattern of soldering pads]

DIM	Milimeters		Inches	
	Min.	Max.	Min.	Max.
A	-	1.10	-	0.043
A1	-	0.05	-	0.002
c	0.203		0.008	
b	0.34	0.54	0.013	0.021
D	4.90	5.10	0.193	0.201
D2	4.15	4.35	0.163	0.171
E	5.90	6.10	0.232	0.240
E1	4.00	4.20	0.157	0.165
E3	0.20	0.40	0.008	0.016
e	1.27		0.050	
L	0.60	0.80	0.024	0.031
L1	0.53		0.021	
L2	0.25		0.010	
N	8			
bbb	0.10		0.004	
eee	0.08		0.003	

DIM	Milimeters	Inches
	Nom.	Nom.
b1	4.45	0.175
b2	1.27	0.050
b3	0.64	0.025
I1	0.72	0.028
I2	4.58	0.180
I3	6.60	0.260
I4	1.13	0.044
I5	0.50	0.020

Dimension in mm / inches