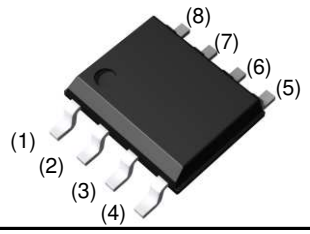
ZDS020N60

Nch 600V 0.63A Power MOSFET Datasheet

V_{DSS}	600V
$R_{DS(on)}$ (Max.)	5.0Ω
I_D	0.63A
P_D	2.0W

●Outline

SOP8
(SC-87)



●Features

1) Low on-resistance.

2) Fast switching speed.

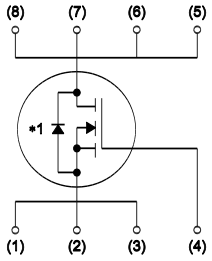
3) Gate-source voltage (V_{GSS}) guaranteed to be ±30V.

4) Drive circuits can be simple.

5) Parallel use is easy.

6) Pb-free lead plating ; RoHS compliant

●Inner circuit



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

*1 BODY DIODE

●Application

Switching Power Supply

●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	330
	Tape width (mm)	12
	Basic ordering unit (pcs)	2,500
	Taping code	TB
	Marking	ZDS020N60

●Absolute maximum ratings(T_a = 25℃)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	600	V
Continuous drain current	T_c = 25℃	I_D *1	±0.63	A
Pulsed drain current		$I_{D,pulse}$ *2	±2.5	A
Gate - Source voltage		V_{GSS}	±30	V
Power dissipation (T_c = 25℃)		P_D	2.0	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}	-	-	62.5	℃/W

●Electrical characteristics(T_a = 25℃)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	600	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V	-		100	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS\ (th)}$	V_{DS} = 10V, I_D = 1mA	2.0	-	4.0	V
Static drain - source on - state resistance	$R_{DS(on)}$ *3	V_{GS} = 10V, I_D = 0.5A	-	4.4	5.0	Ω

●Electrical characteristics(T_a = 25℃)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs} *3	V_{DS} = 10V, I_D = 0.5A	0.05	0.5	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	310	-	pF
Output capacitance	C_{oss}	V_{DS} = 10V	-	145	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	40	-	
Turn - on delay time	$t_{d(on)}$ *3	V_{DD} ≃ 200V, V_{GS} = 10V	-	25	-	ns
Rise time	t_r *3	I_D = 600mA	-	20	-	
Turn - off delay time	$t_{d(off)}$ *3	R_L = 333Ω	-	65	-	
Fall time	t_f *3	R_G = 50Ω	-	65	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *3	V_{DD} ≃ 450V	-	12	20	nC
Gate - Source charge	Q_{gs} *3	I_D = 600mA	-	3	-	
Gate - Drain charge	Q_{gd} *3	V_{GS} = 10V	-	5	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 450V, I_D = 600mA	-	5	-	V

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 Pulsed

●**Body diode electrical characteristics** (Source-Drain)(T_a = 25℃)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25℃	-	-	0.63	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	2.5	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 1A	-	-	1.5	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

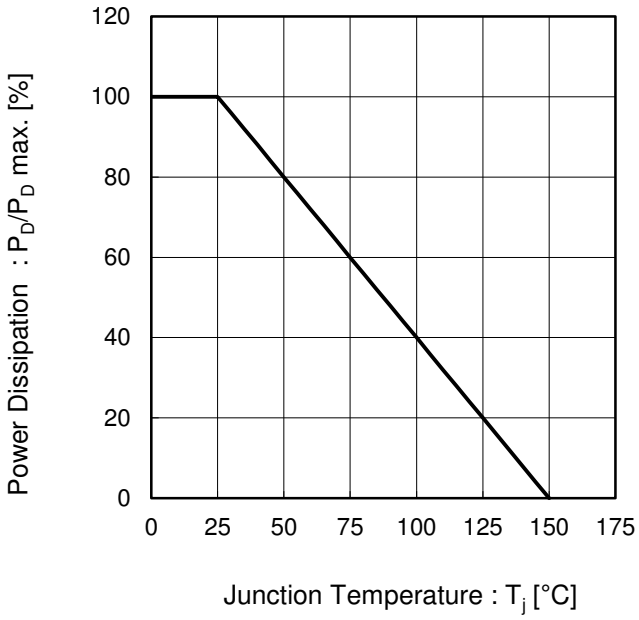


Fig.2 Maximum Safe Operating Area

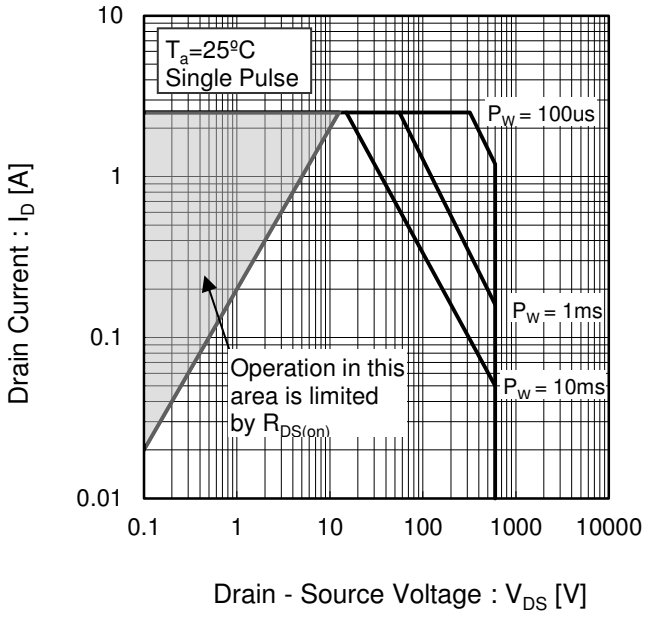
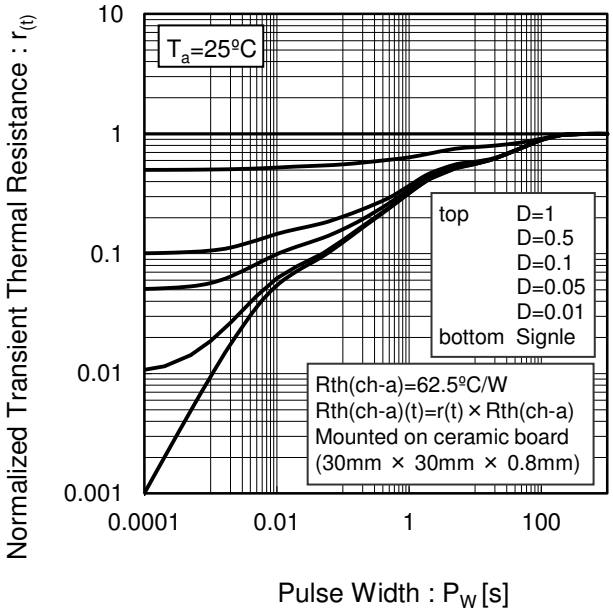


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

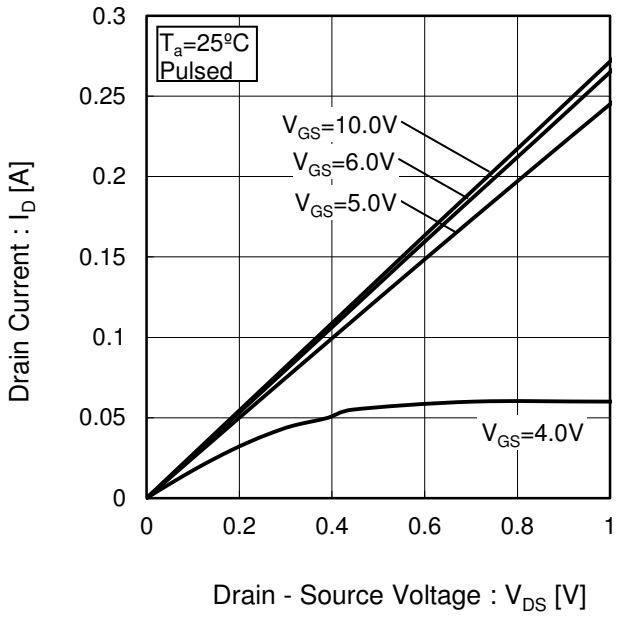


Fig.5 Typical Output Characteristics(II)

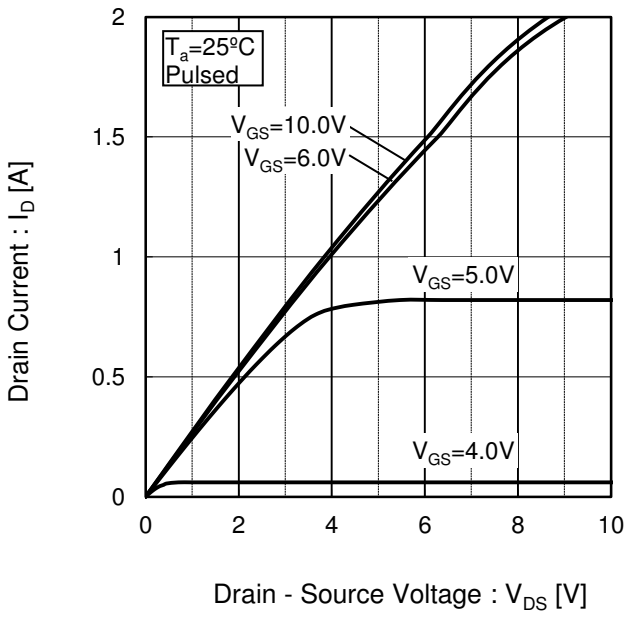


Fig.6 Breakdown Voltage vs. Channel Temperature

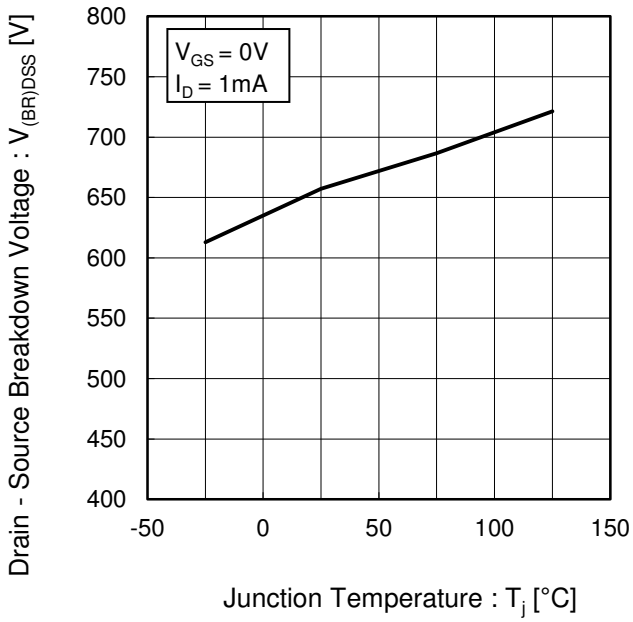
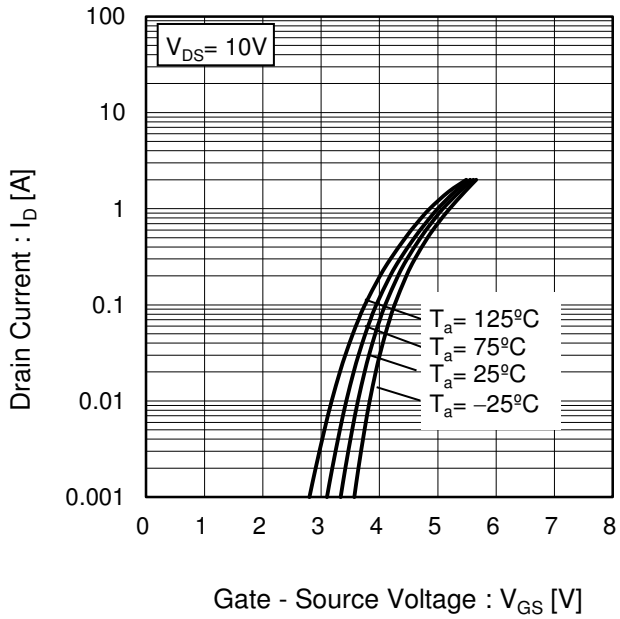


Fig.7 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.8 Gate Threshold Voltage vs. Channel Temperature

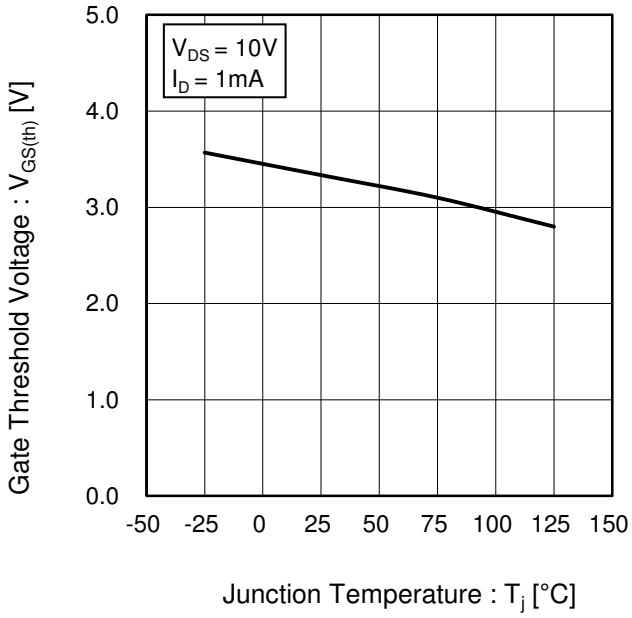


Fig.9 Transconductance vs. Drain Current

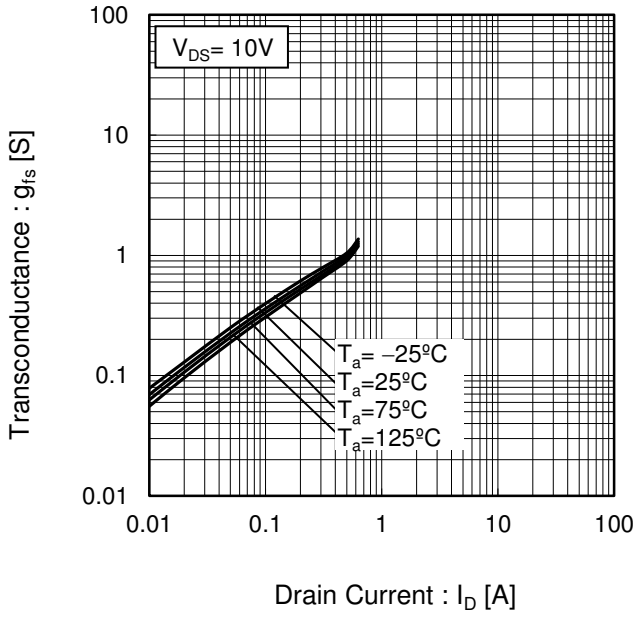
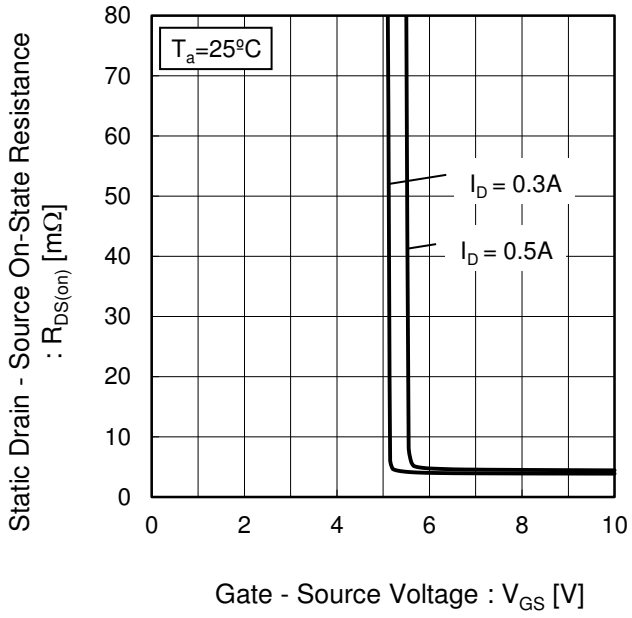


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

Fig.11 Static Drain - Source On - State Resistance vs. Drain Current(II)

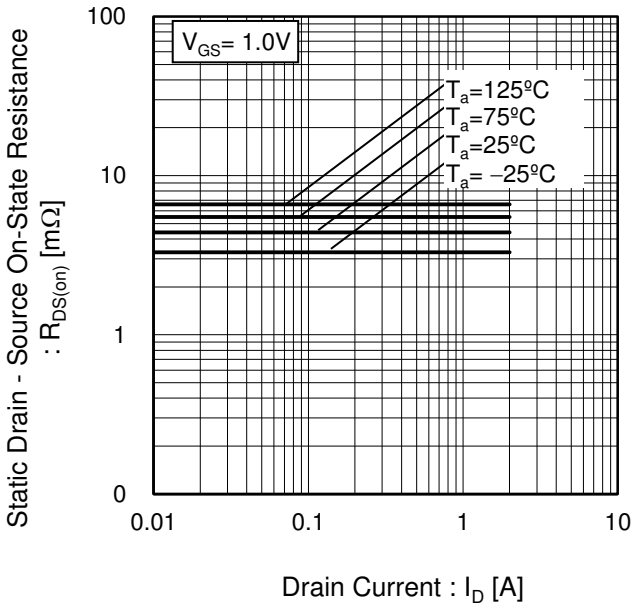
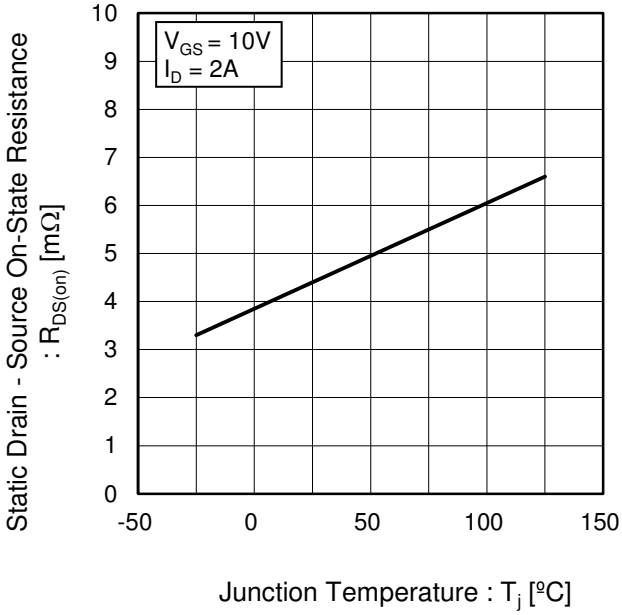


Fig.12 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

Fig.13 Typical Capacitance vs. Drain - Source Voltage

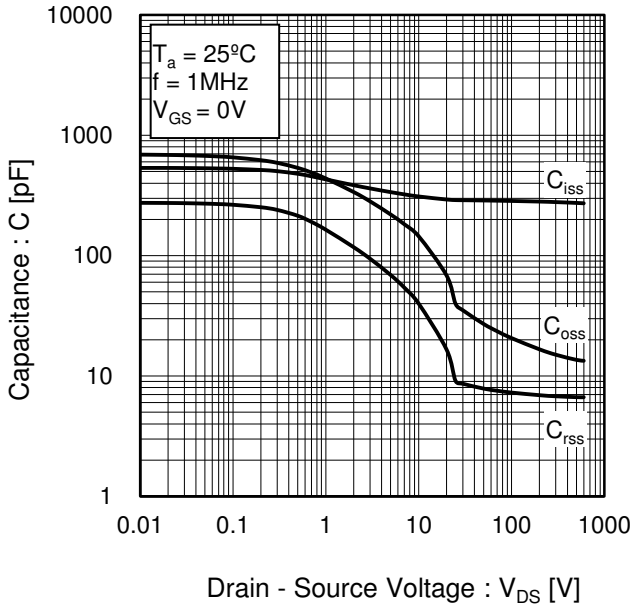


Fig.14 Switching Characteristics

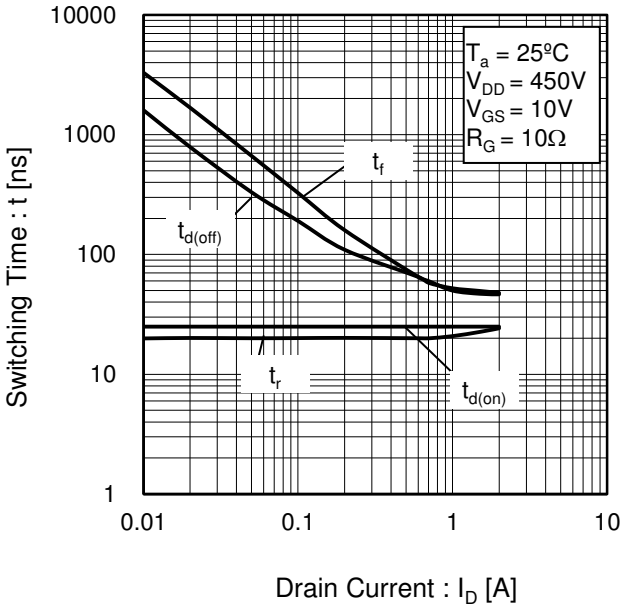


Fig.15 Dynamic Input Characteristics

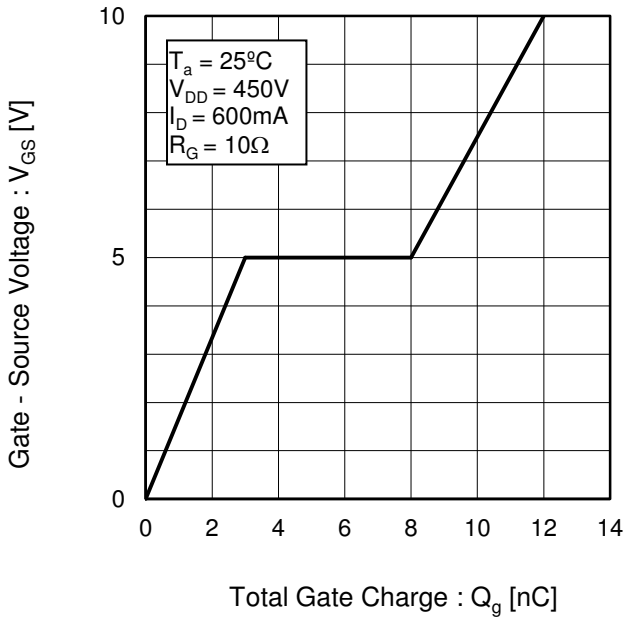
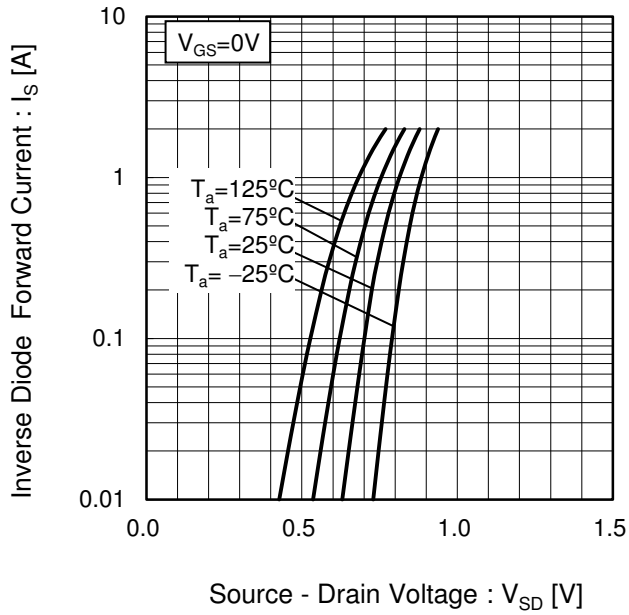


Fig.16 Inverse Diode Forward Current vs. Source - Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

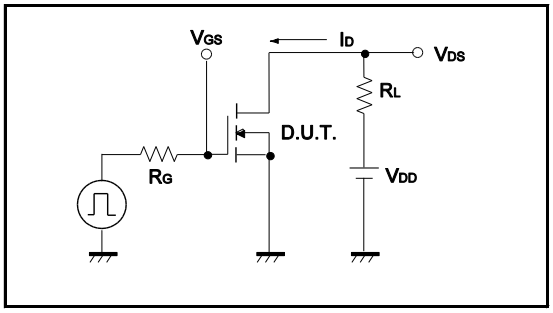


Fig.1-2 Switching Waveforms

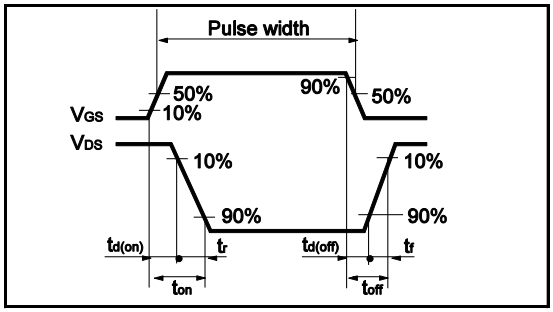


Fig.2-1 Gate Charge Measurement Circuit

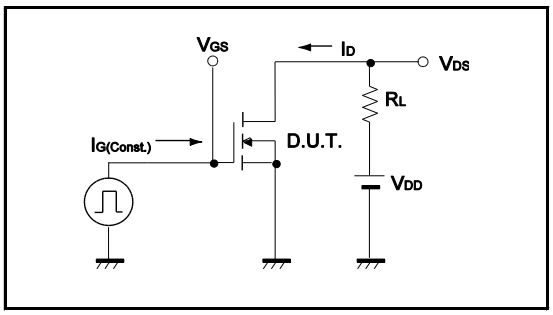
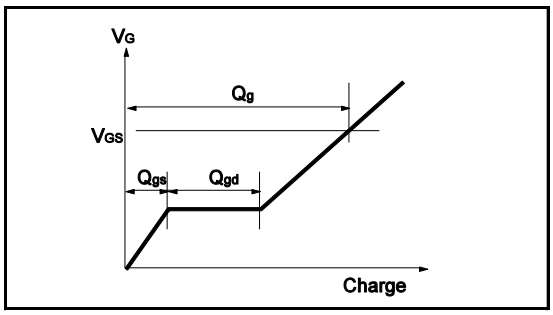
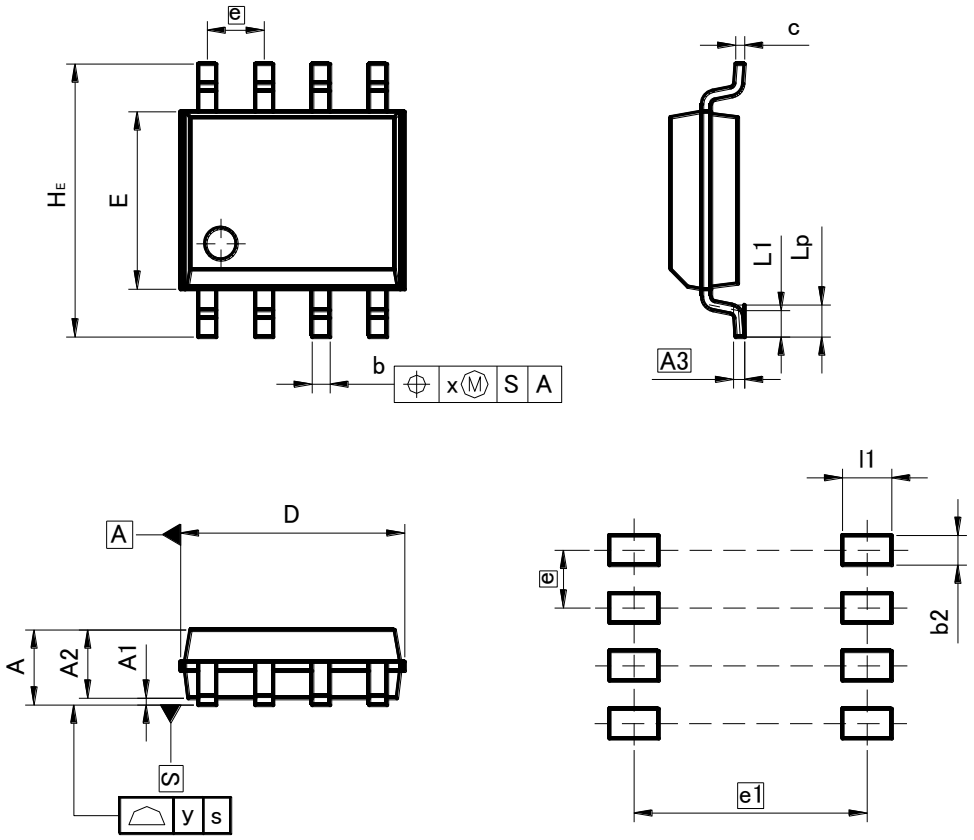


Fig.2-2 Gate Charge Waveform



●**Dimensions** (Unit : mm)

SOP8



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	−	1.75	−	0.069
A1	0.15		0.006	
A2	1.40	1.60	0.055	0.063
A3	0.25		0.01	
b	0.30	0.50	0.012	0.02
c	0.10	0.30	0.004	0.012
D	4.80	5.20	0.189	0.205
E	3.75	4.05	0.148	0.159
e	1.27		0.05	
HE	5.70	6.30	0.224	0.248
L1	0.50	0.70	0.02	0.028
Lp	0.65	0.85	0.026	0.033
x	0.15		0.006	
y	0.10		0.004	

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	−	0.65	−	0.026
e1	5.15		0.203	
l1	−	1.15	−	0.045

Dimension in mm/inches

Notes

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