



SCH2080KE

N-channel SiC power MOSFET co-packaged with SiC-SBD

Datasheet

V_{DSS}	1200V
$R_{DS(on)}$ (Typ.)	80m Ω
I_D	35A
P_D	179W

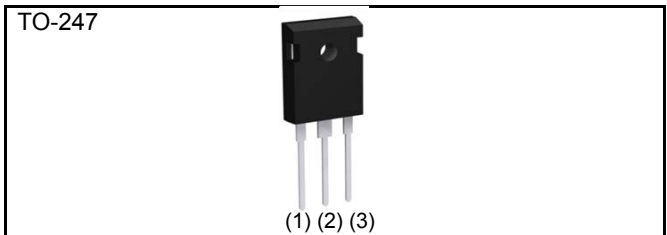
●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Low V_{SD}
- 5) Easy to parallel
- 6) Simple to drive
- 7) Pb-free lead plating ; RoHS compliant

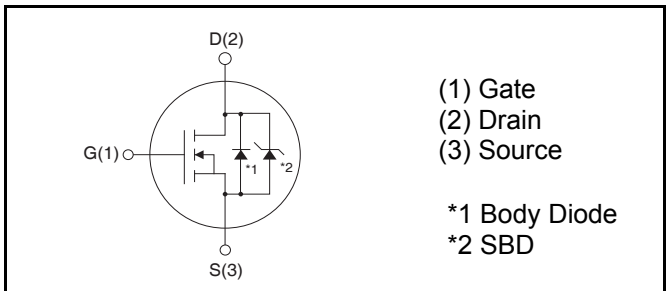
●Application

- Solar inverters
- DC/DC converters
- Induction heating
- Motor drives

●Outline



●Inner circuit



●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Taping code	-
	Marking	SCH2080KE

●Absolute maximum ratings ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Value	Unit	
Drain - Source voltage	V_{DSS}	1200	V	
Continuous drain current	$T_c = 25^\circ\text{C}$	I_D^{*1}	35	A
	$T_c = 100^\circ\text{C}$	I_D^{*1}	22	A
Pulsed drain current	$I_{D,pulse}^{*2}$	80	A	
Gate - Source voltage	V_{GSS}	-6 to 22	V	
Power dissipation ($T_c = 25^\circ\text{C}$)	P_D	179	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 - case	R_{thJC}	-	-	0.7	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	50	°C/W
Soldering temperature, wavesoldering for 10s	T_{sold}	-	-	265	°C

●Electrical characteristics ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	1200	-	-	V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 1200V, V_{GS} = 0V$	-	20	400	μA
		$T_j = 150^\circ\text{C}$	-	170	-	
Gate - Source leakage current	I_{GSS+}	$V_{GS} = +22V, V_{DS} = 0V$	-	-	100	nA
Gate - Source leakage current	I_{GSS-}	$V_{GS} = -6V, V_{DS} = 0V$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 4.4mA$	1.6	-	4.0	V
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 18V, I_D = 10A$	-	80	117	m Ω
		$T_j = 125^\circ\text{C}$	-	125	-	
Gate input resistance	R_G	$f = 1MHz, \text{open drain}$	-	6.3	-	Ω

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs}^{*3}	$V_{DS} = 10V, I_D = 10A$	-	3.7	-	S
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	1850	-	pF
Output capacitance	C_{oss}	$V_{DS} = 800V$	-	175	-	
Reverse transfer capacitance	C_{rss}	$f = 1MHz$	-	20	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} = 400V, V_{GS} = 18V$	-	37	-	ns
Rise time	t_r^{*3}	$I_D = 10A$	-	33	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L = 40\Omega$	-	70	-	
Fall time	t_f^{*3}	$R_G = 0\Omega$	-	28	-	

●Gate Charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*3}	$V_{DD} = 400V$	-	106	-	nC
Gate - Source charge	Q_{gs}^{*3}	$I_D = 10A$	-	27	-	
Gate - Drain charge	Q_{gd}^{*3}	$V_{GS} = 18V$	-	31	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 400V, I_D = 10A$	-	9.7	-	V

*1 Limited only by maximum temperature allowed.

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

*3 Pulsed

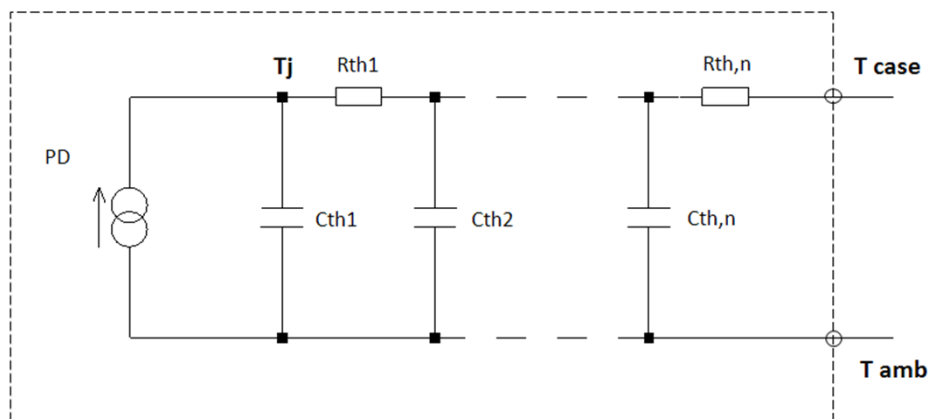
●Body diode electrical characteristics (Source-Drain) ($T_a = 25^\circ\text{C}$)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S^{*1}	$T_C = 25^\circ\text{C}$	-	-	35	A
Inverse diode direct current, pulsed	I_{SM}^{*2}		-	-	80	A
Forward voltage	V_{SD}^{*3}	$V_{GS} = 0\text{V}, I_S = 10\text{A}$	-	1.3	-	V
Reverse recovery time	t_{rr}^{*3}	$I_F = 10\text{A}, V_R = 400\text{V}$ $di/dt = 150\text{A}/\mu\text{s}$	-	37	-	ns
Reverse recovery charge	Q_{rr}^{*3}		-	60	-	nC
Peak reverse recovery current	I_{rrm}^{*3}		-	2.4	-	A

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	0.098	K/W
R_{th2}	0.237	
R_{th3}	0.212	

Symbol	Value	Unit
C_{th1}	0.005	Ws/K
C_{th2}	0.032	
C_{th3}	0.666	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

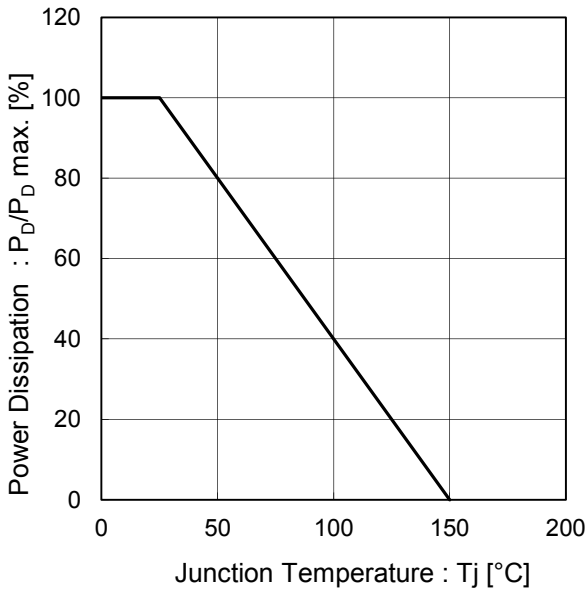


Fig.2 Maximum Safe Operating Area

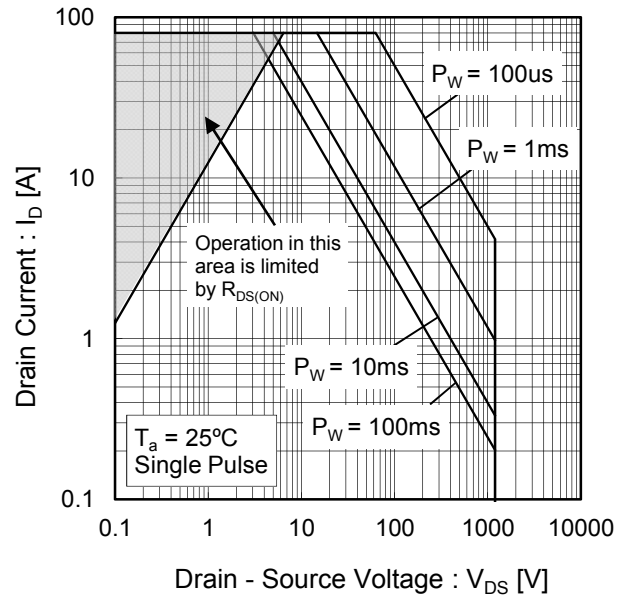
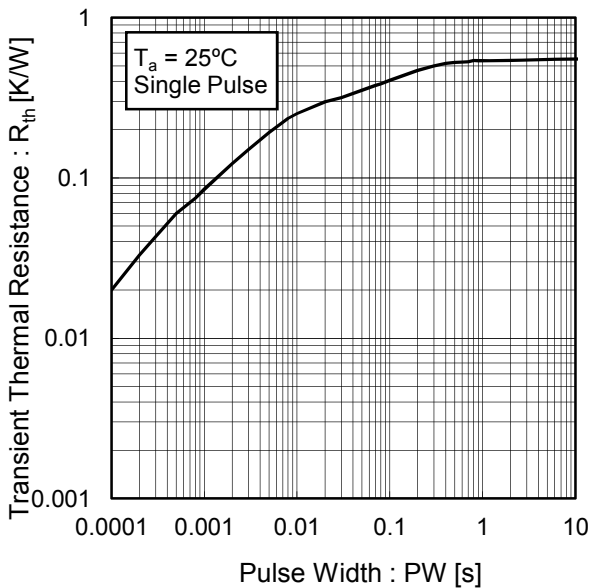


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

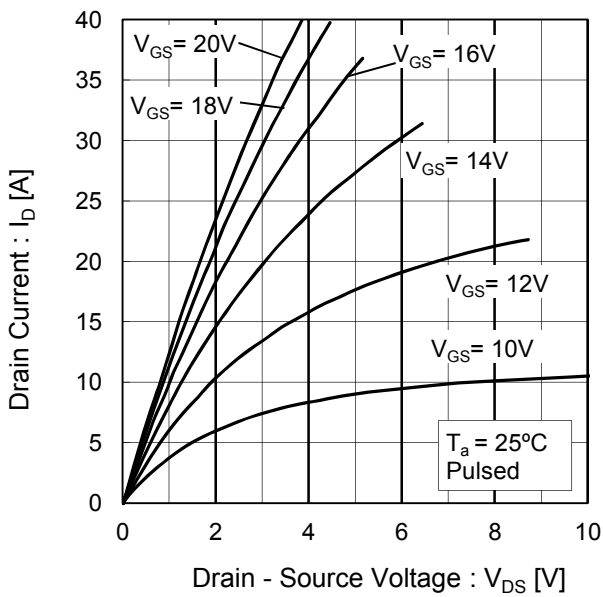


Fig.5 Typical Output Characteristics(II)

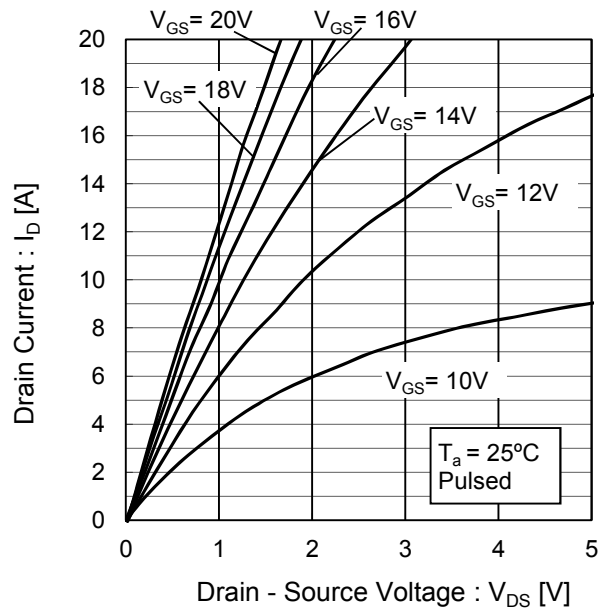


Fig.6 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(I)

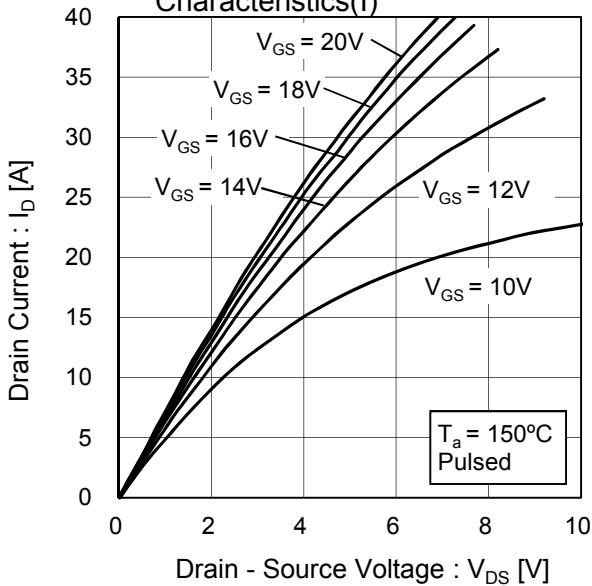
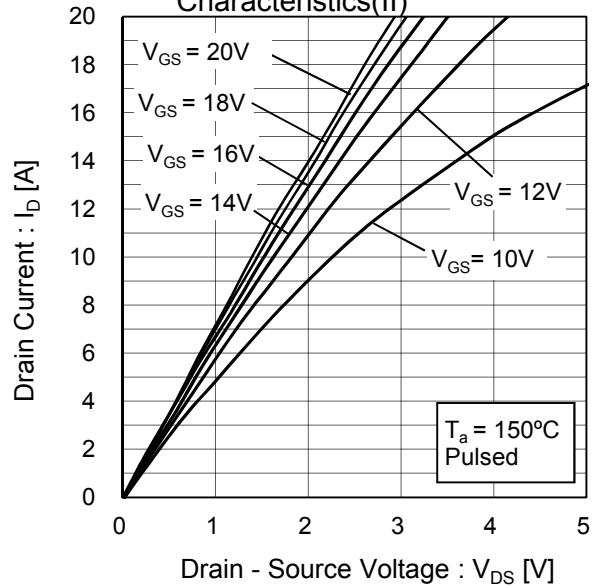


Fig.7 $T_j = 150^\circ\text{C}$ Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

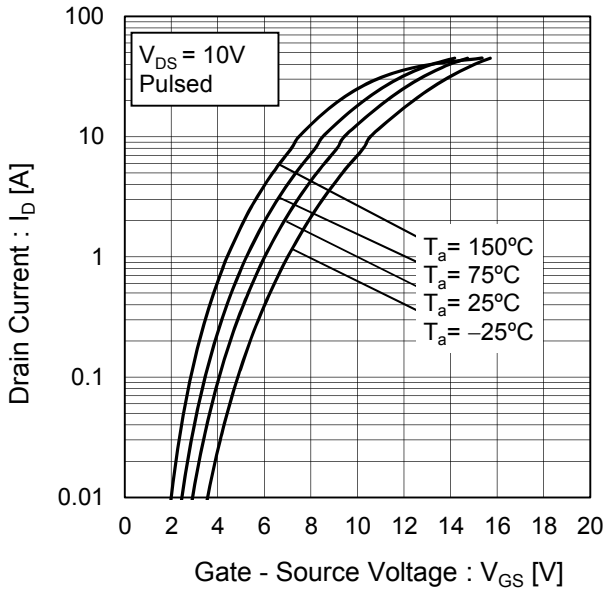


Fig.9 Gate Threshold Voltage vs. Junction Temperature

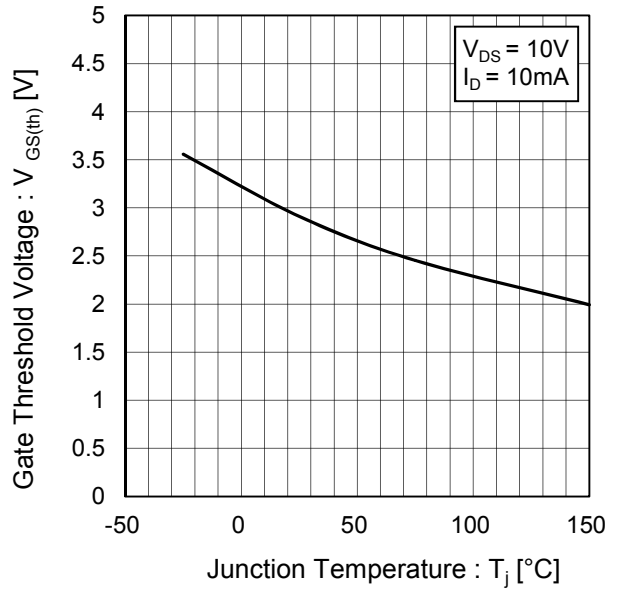
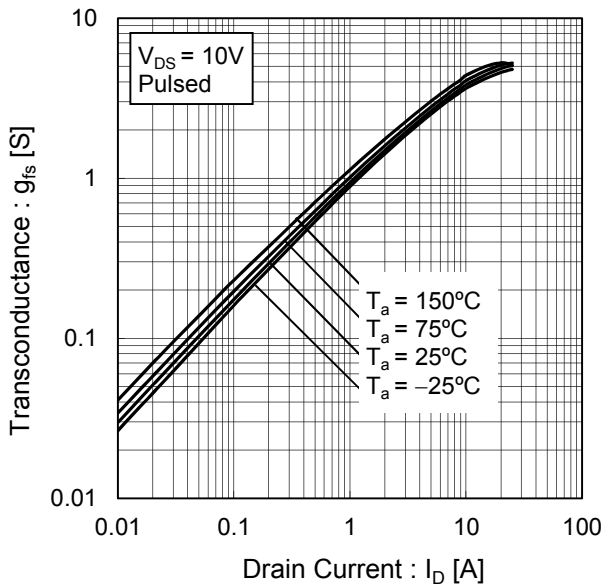


Fig.10 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.11 Static Drain - Source On - State Resistance vs. Gate - Source Voltage

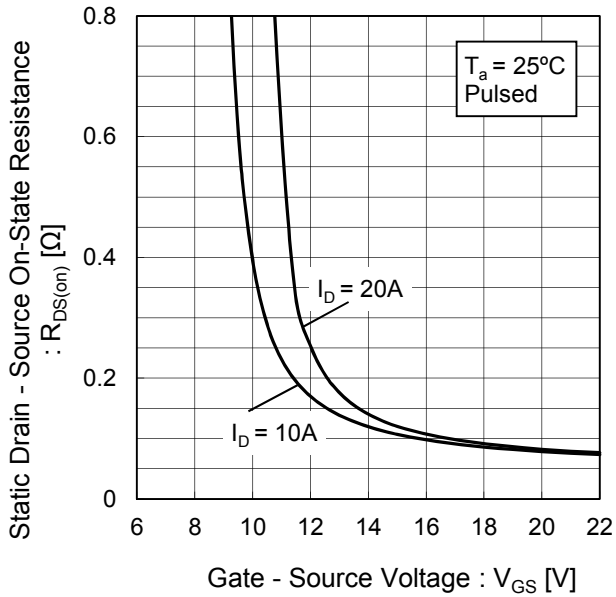


Fig.12 Static Drain - Source On - State Resistance vs. Junction Temperature

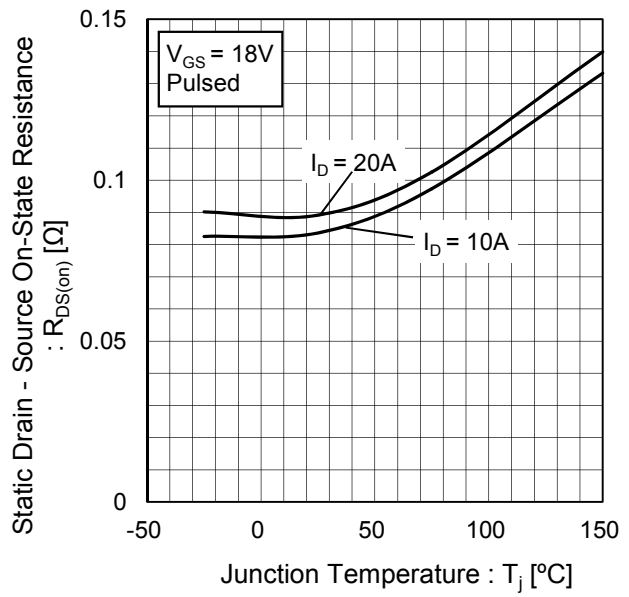
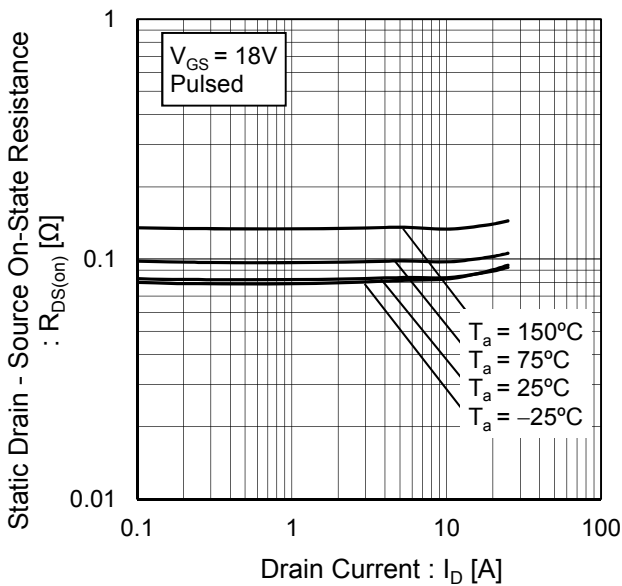


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.14 Typical Capacitance vs. Drain - Source Voltage

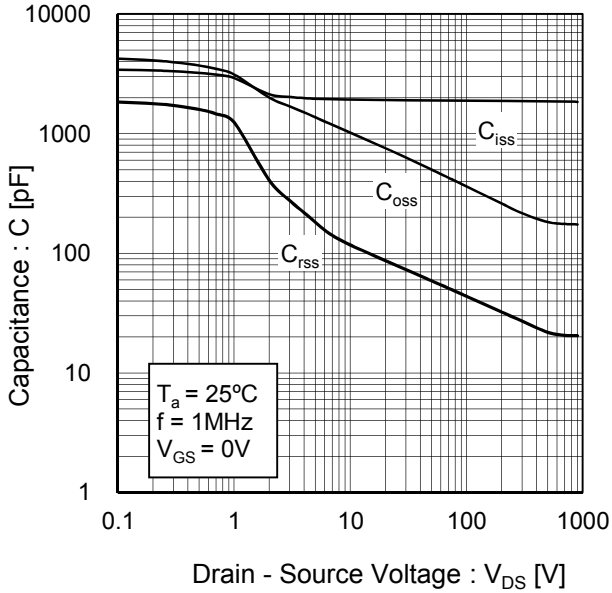


Fig.15 Coss Stored Energy

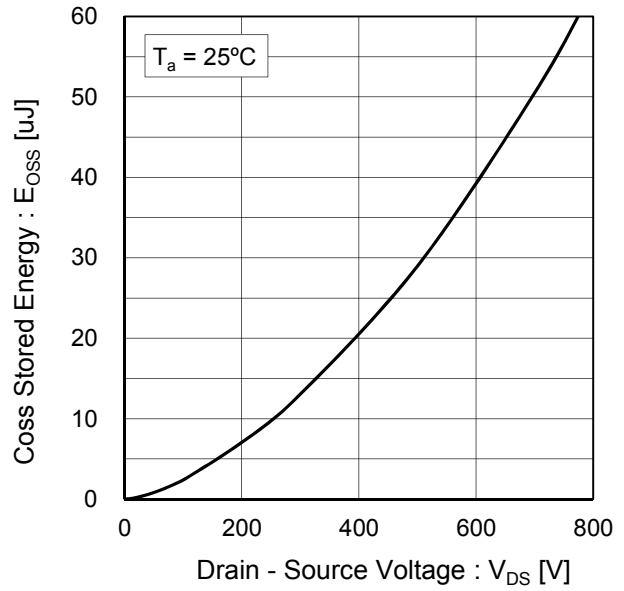


Fig.16 Switching Characteristics

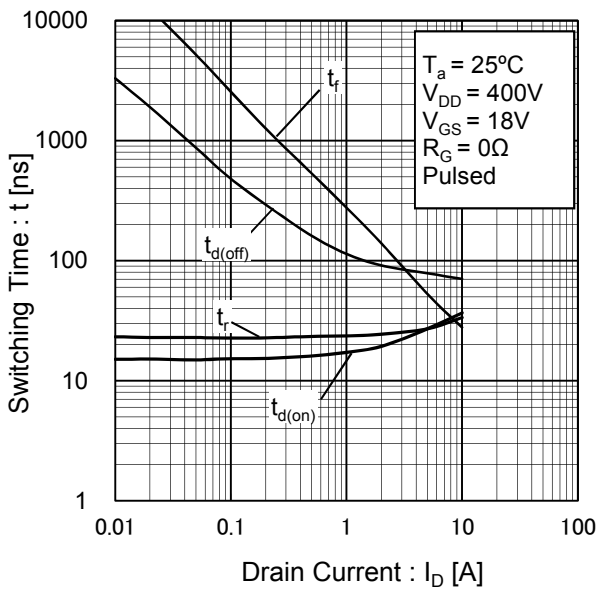
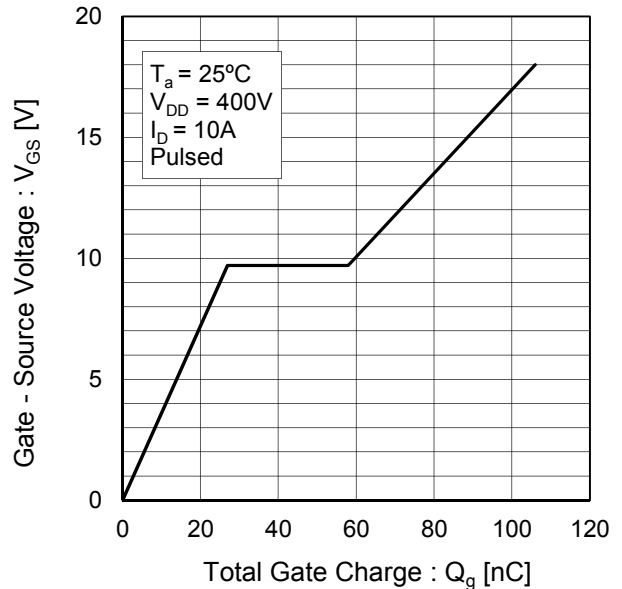


Fig.17 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.18 Inverse Diode Forward Current vs. Source - Drain Voltage

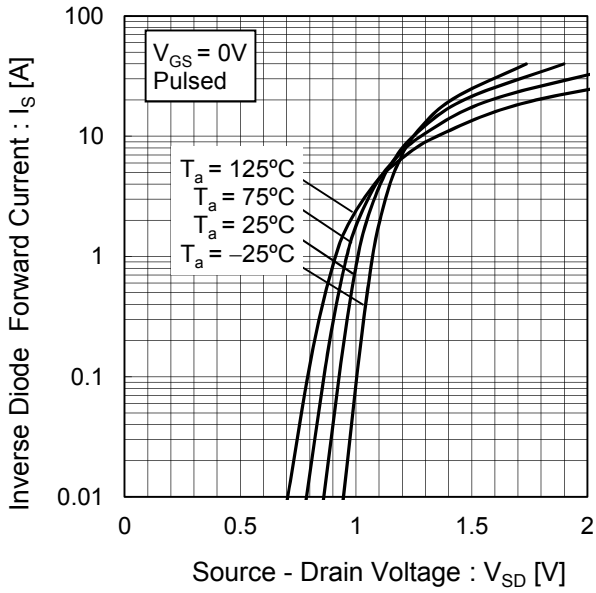
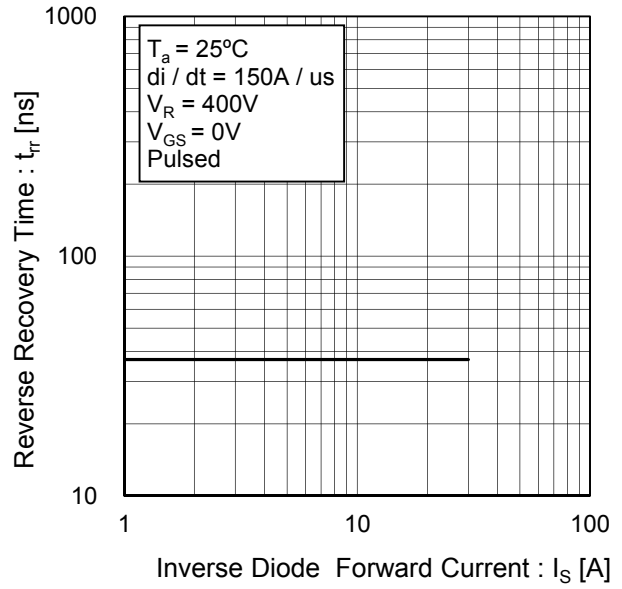


Fig.19 Reverse Recovery Time vs. Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

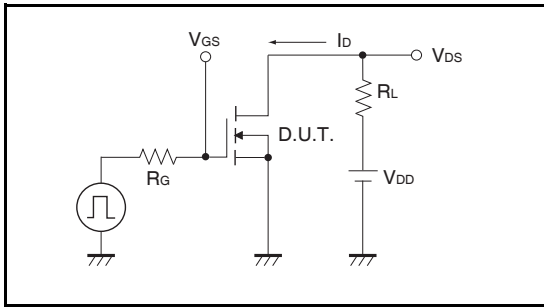


Fig.1-2 Switching Waveforms

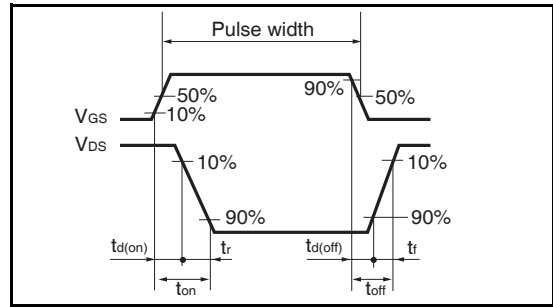


Fig.2-1 Gate Charge Measurement Circuit

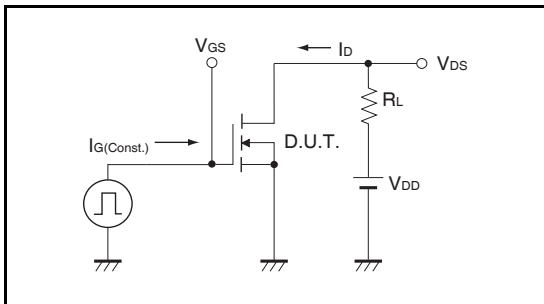


Fig.2-2 Gate Charge Waveform

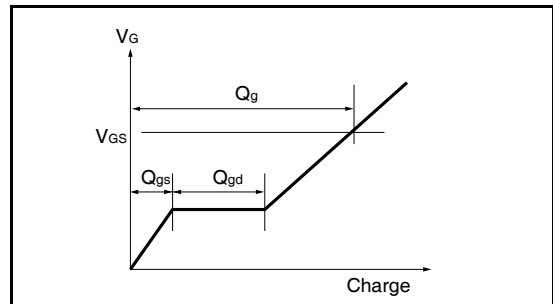


Fig.3-1 di/dt Measurement Circuit

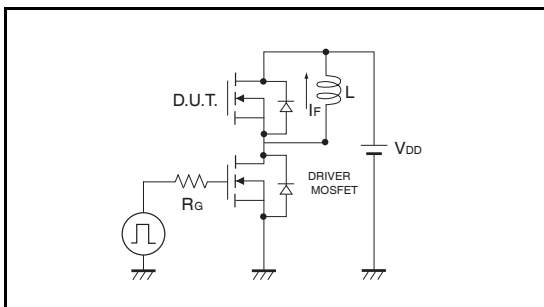
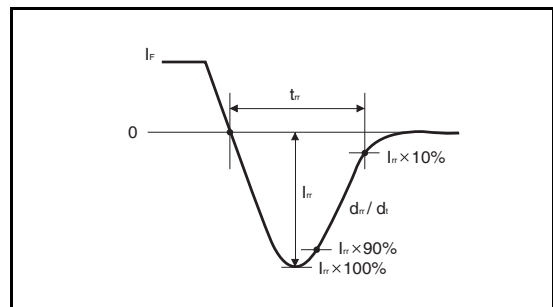
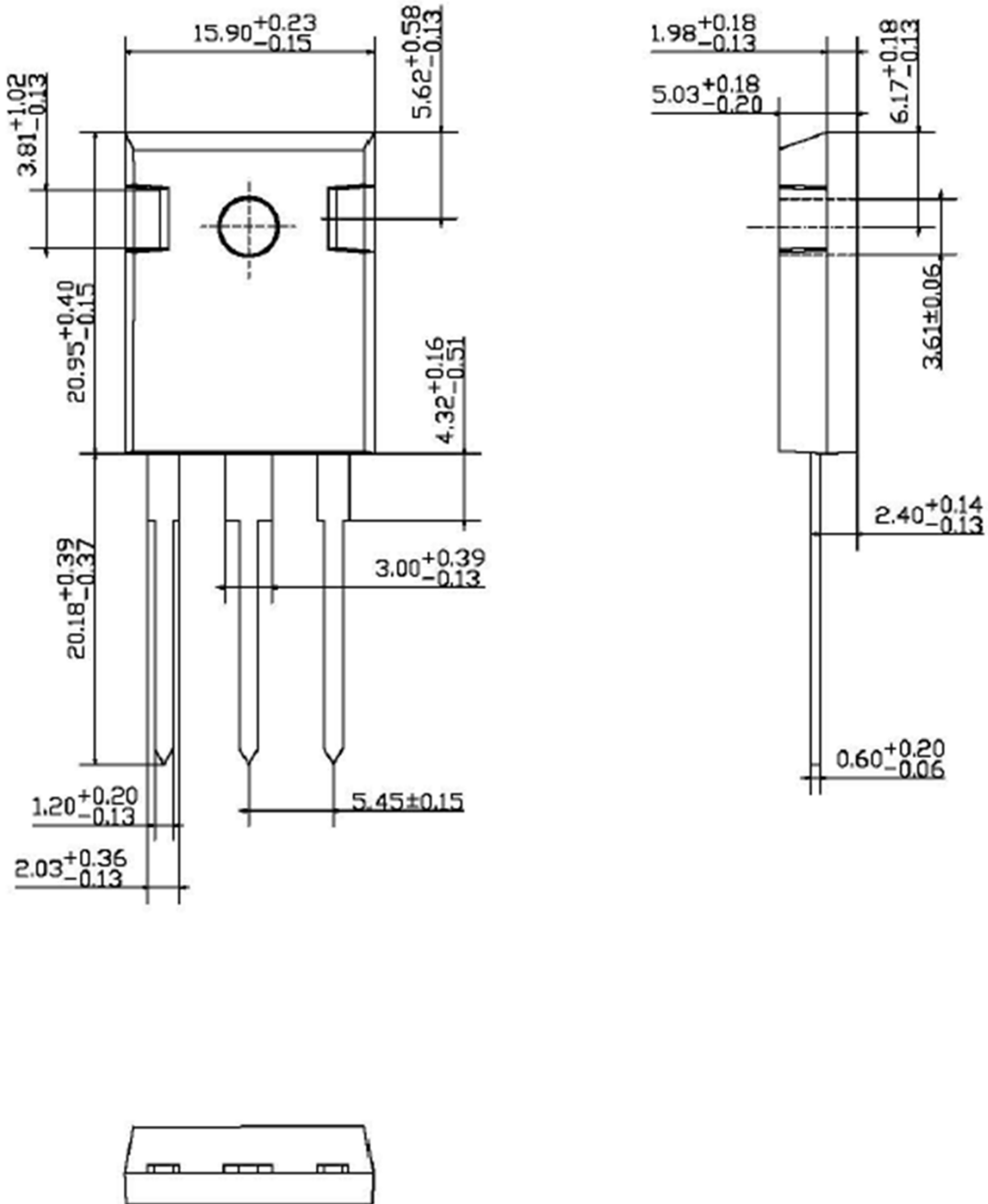


Fig.3-2 di/dt Waveform



●Dimensions (Unit : mm)

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Notes

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