SCH2080KE

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

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

●Outline

TO-247

(1) (2) (3)

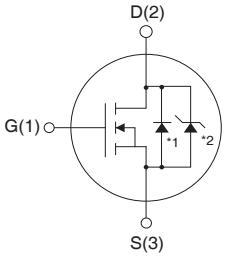
●Features

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

●Inner circuit



(1) Gate
(2) Drain
(3) Source

*1 Body Diode
*2 SBD

●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°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	1200	V
Continuous drain current	T_c = 25°C	I_D *1	35	A
	T_c = 100°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°C)		P_D	179	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	−55 to +150	°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°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				μA
		T_j = 25°C	-	20	400	
		T_j = 150°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				mΩ
		T_j = 25°C	-	80	117	
		T_j = 125°C	-	125	-	
Gate input resistance	R_G	f = 1MHz, 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 = 40Ω	-	70	-	
Fall time	t_f *3	R_G = 0Ω	-	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 ≤ 10μs, Duty cycle ≤ 1%

*3 Pulsed

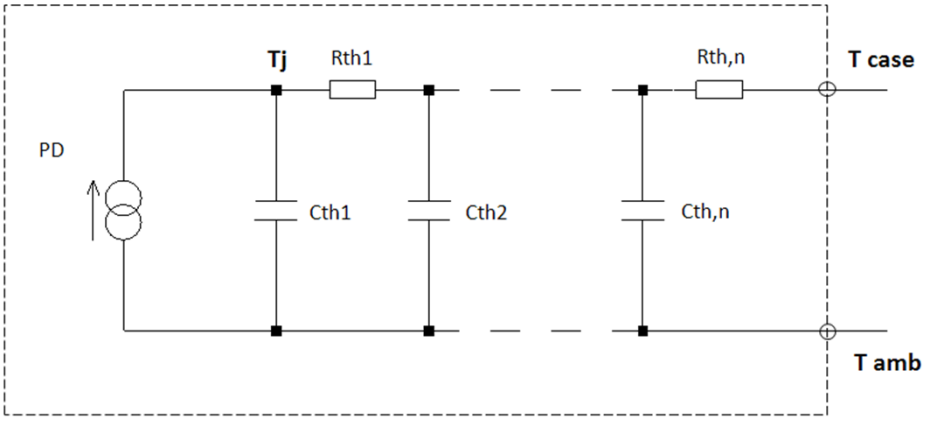
●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	35	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	80	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 10A	-	1.3	-	V
Reverse recovery time	t_{rr} *3	I_F = 10A, V_R = 400V di/dt = 150A/μs	-	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

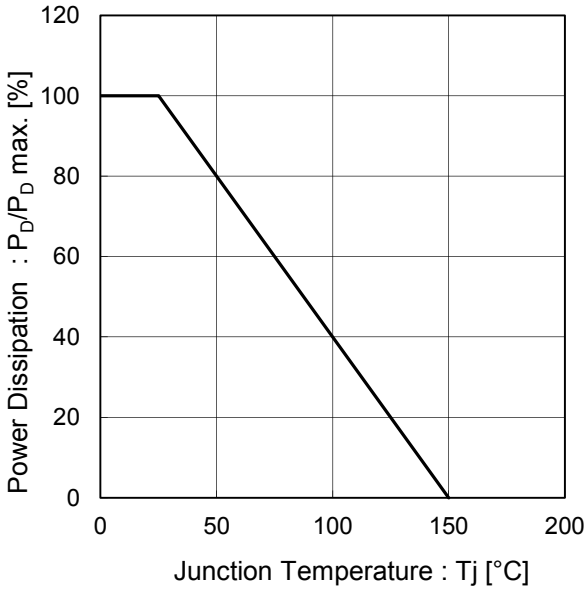


Fig.2 Maximum Safe Operating Area

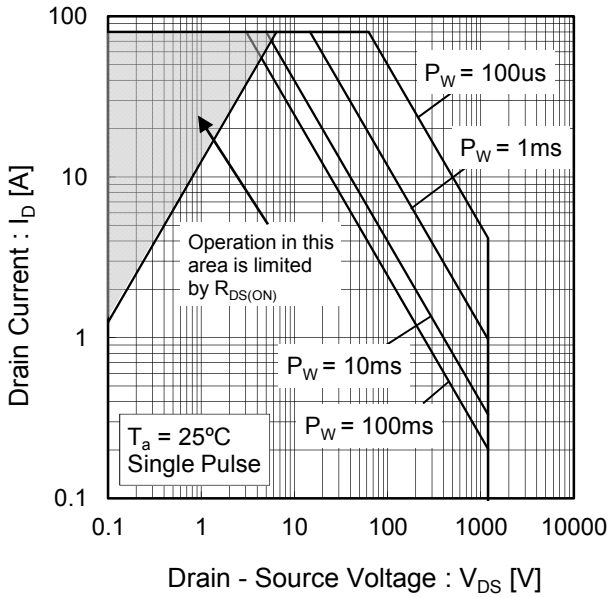
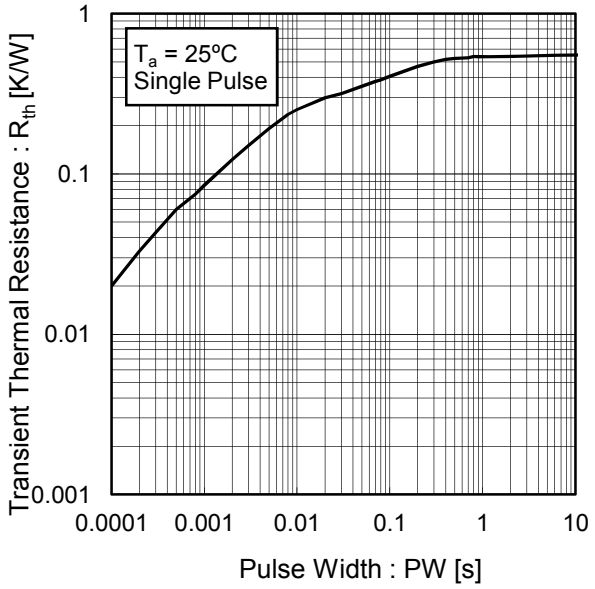


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

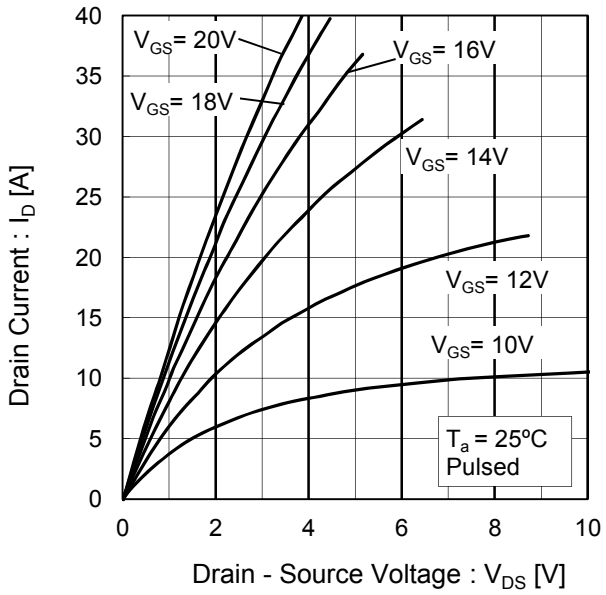


Fig.5 Typical Output Characteristics(II)

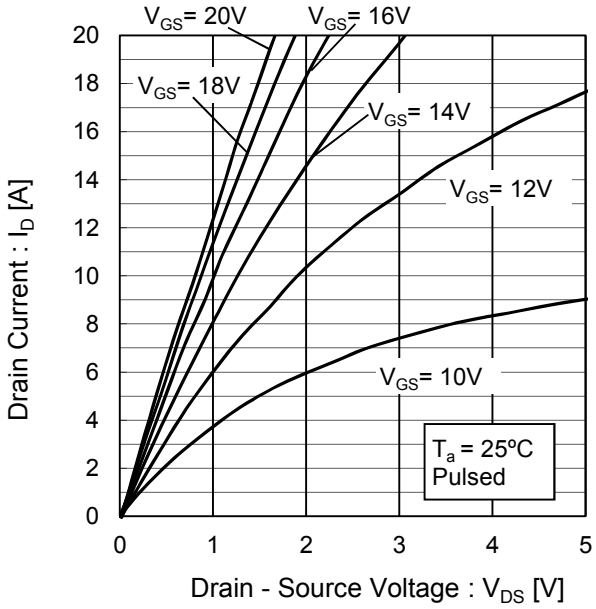


Fig.6 T_j = 150°C Typical Output Characteristics(I)

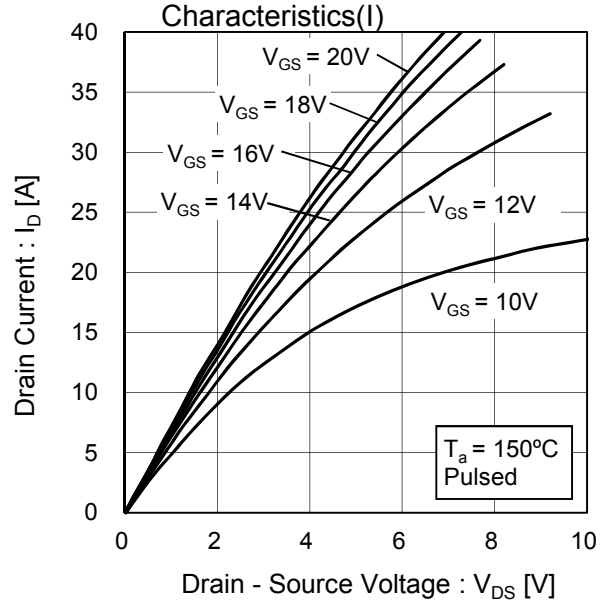
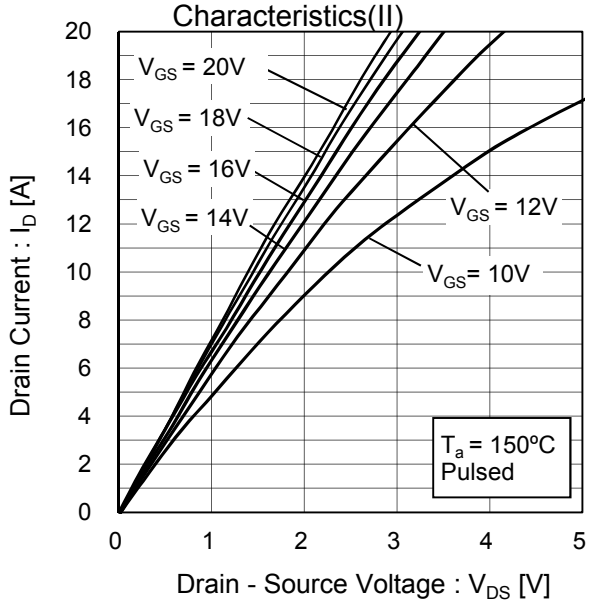


Fig.7 T_j = 150°C Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

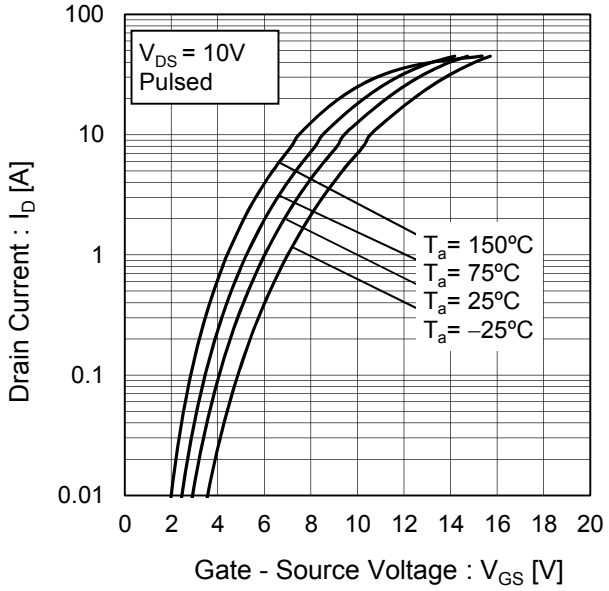


Fig.9 Gate Threshold Voltage vs. Junction Temperature

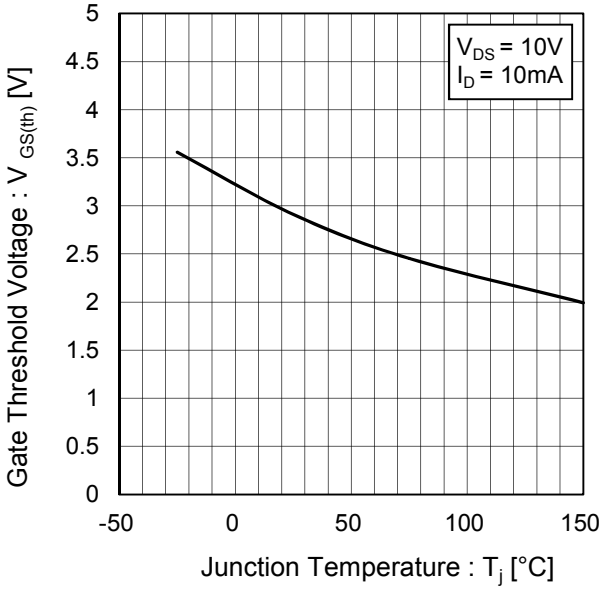
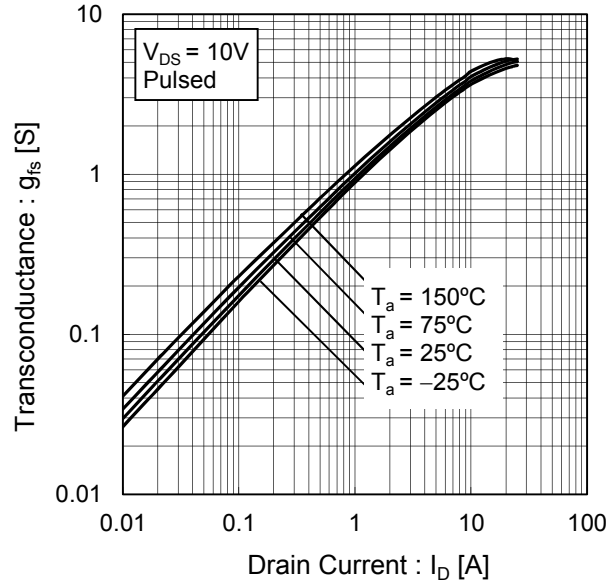


Fig.10 Transconductance vs. Drain Current



●Electrical characteristic curves

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

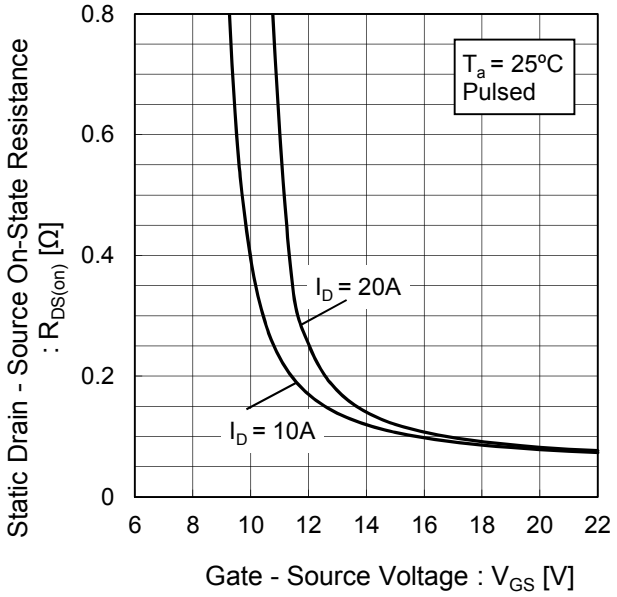


Fig.12 Static Drain - Source On - State Resistance vs. Junction Temperature

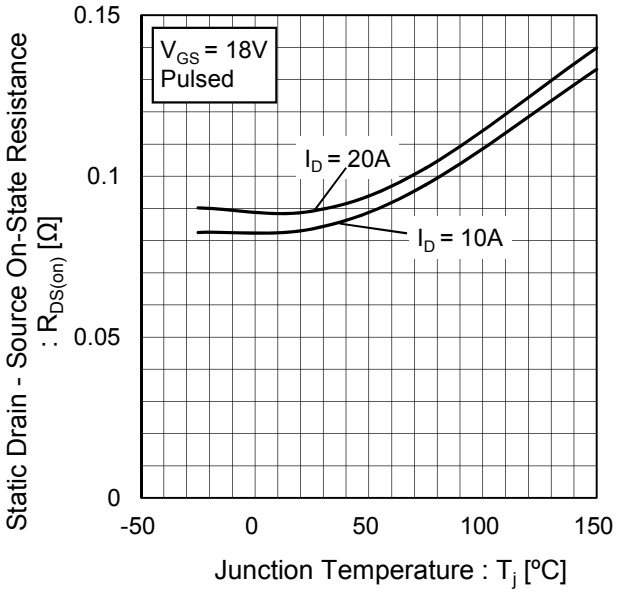
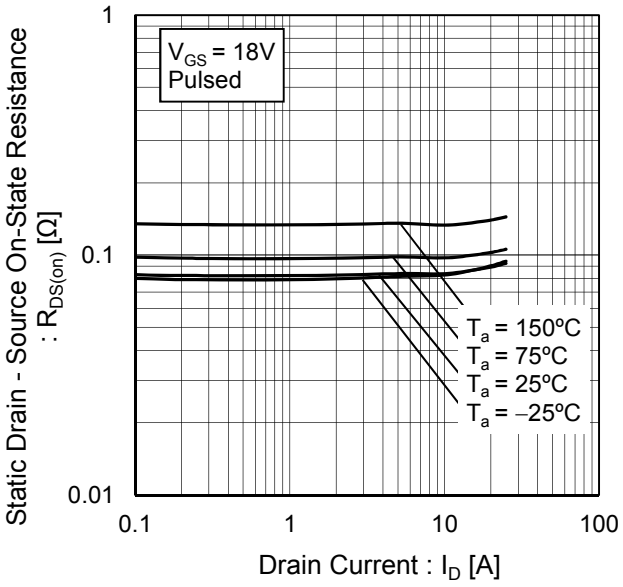


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.14 Typical Capacitance vs. Drain - Source Voltage

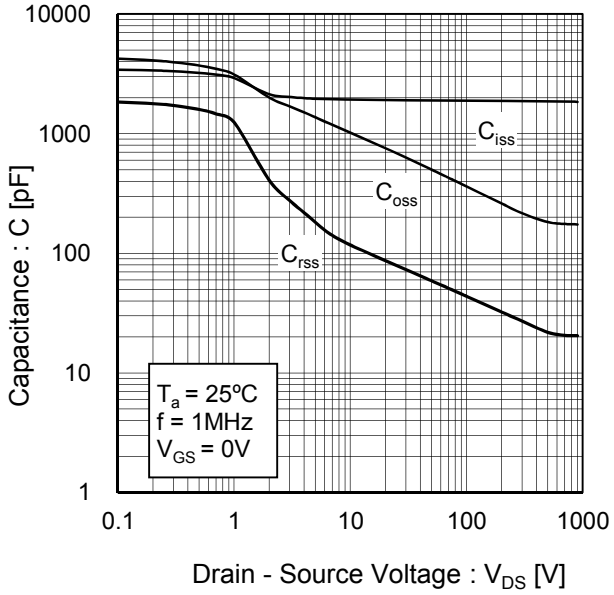


Fig.15 Coss Stored Energy

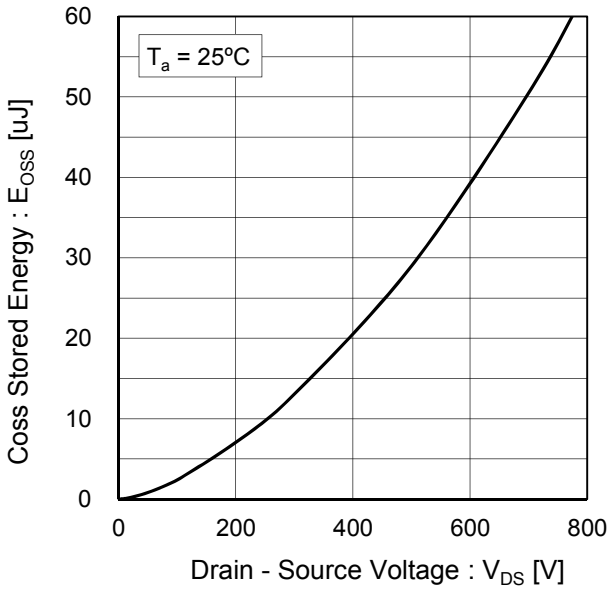


Fig.16 Switching Characteristics

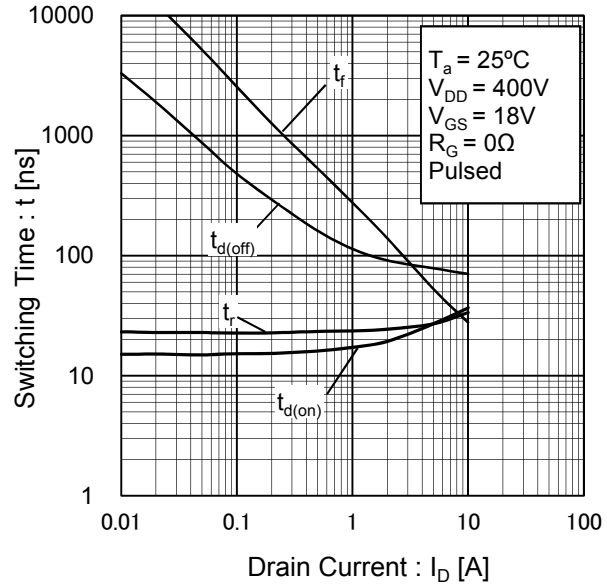
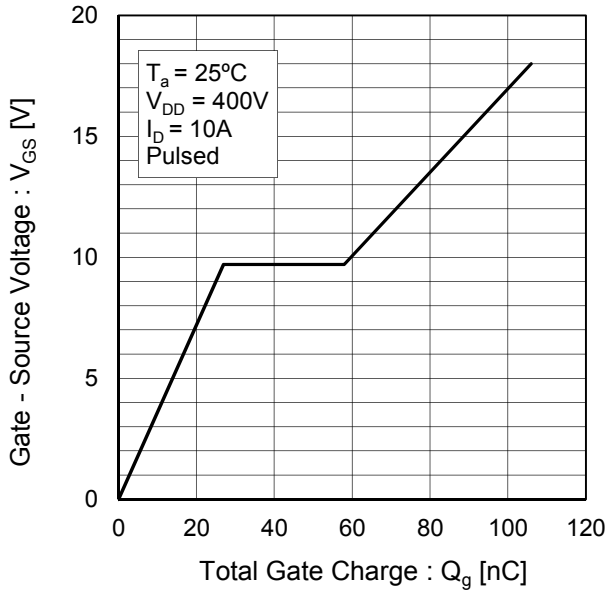


Fig.17 Dynamic Input Characteristics



●Electrical characteristic curves

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

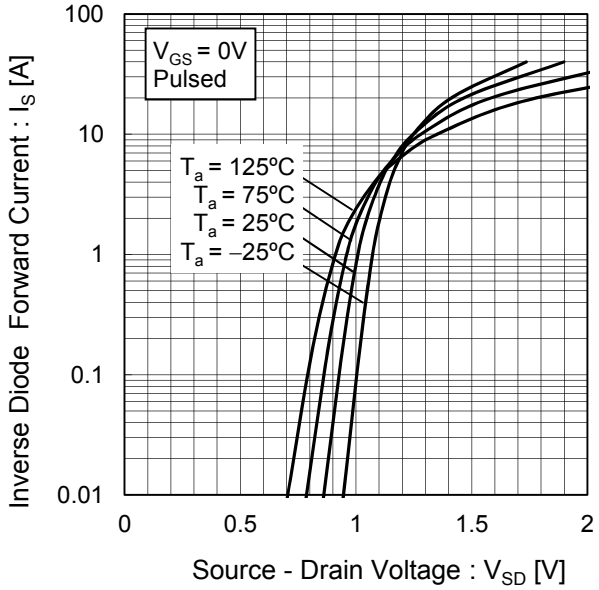
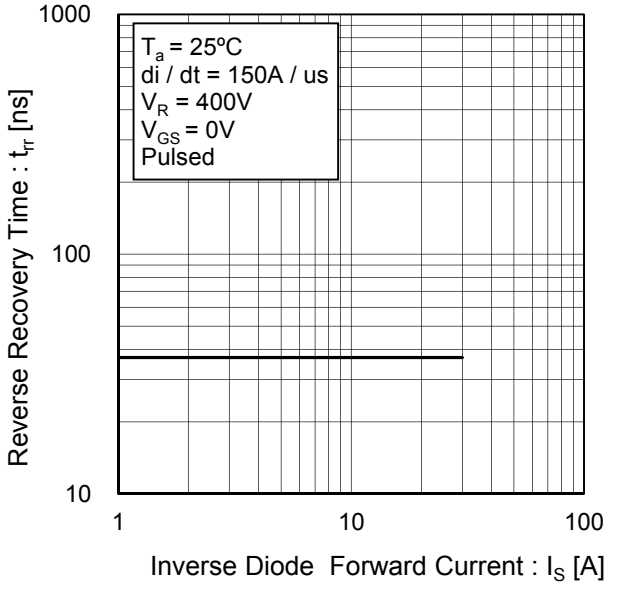


Fig.19 Reverse Recovery Time vs.Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

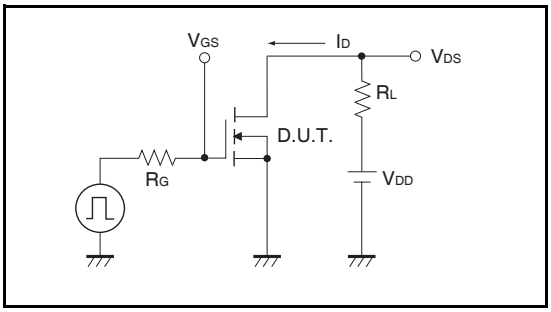


Fig.1-2 Switching Waveforms

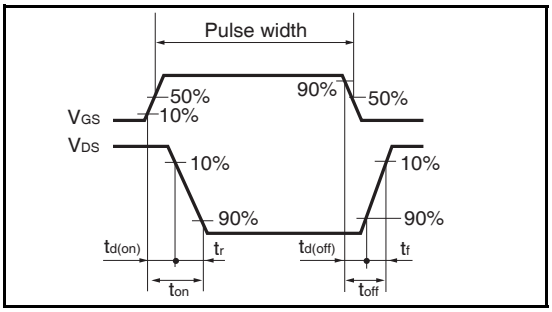


Fig.2-1 Gate Charge Measurement Circuit

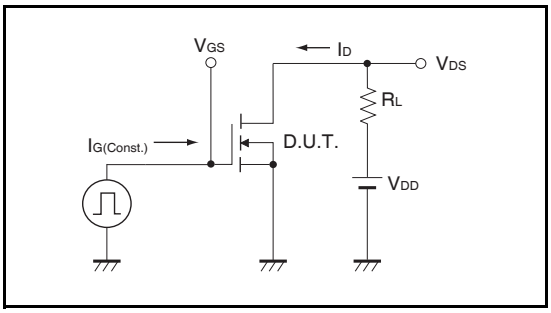


Fig.2-2 Gate Charge Waveform

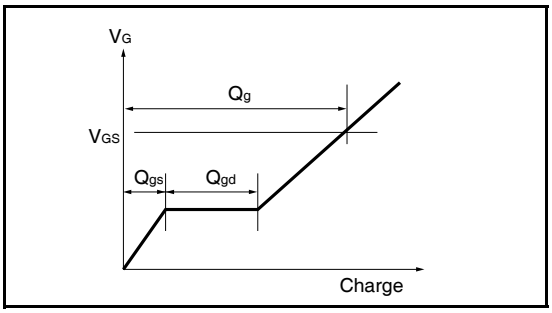


Fig.3-1 di/dt Measurement Circuit

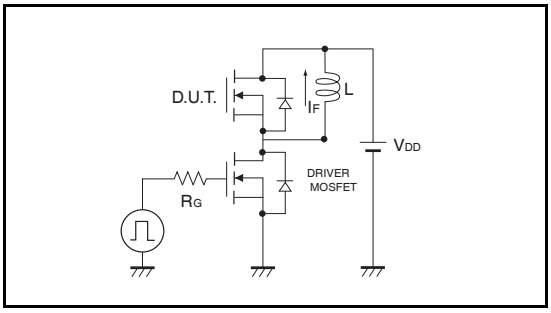
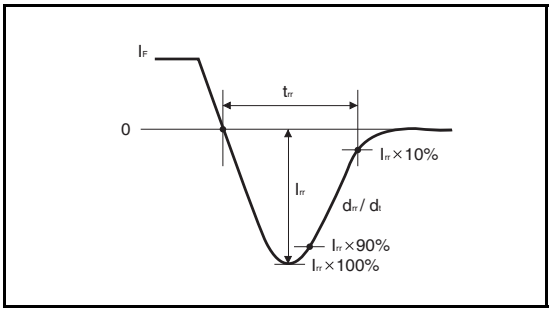
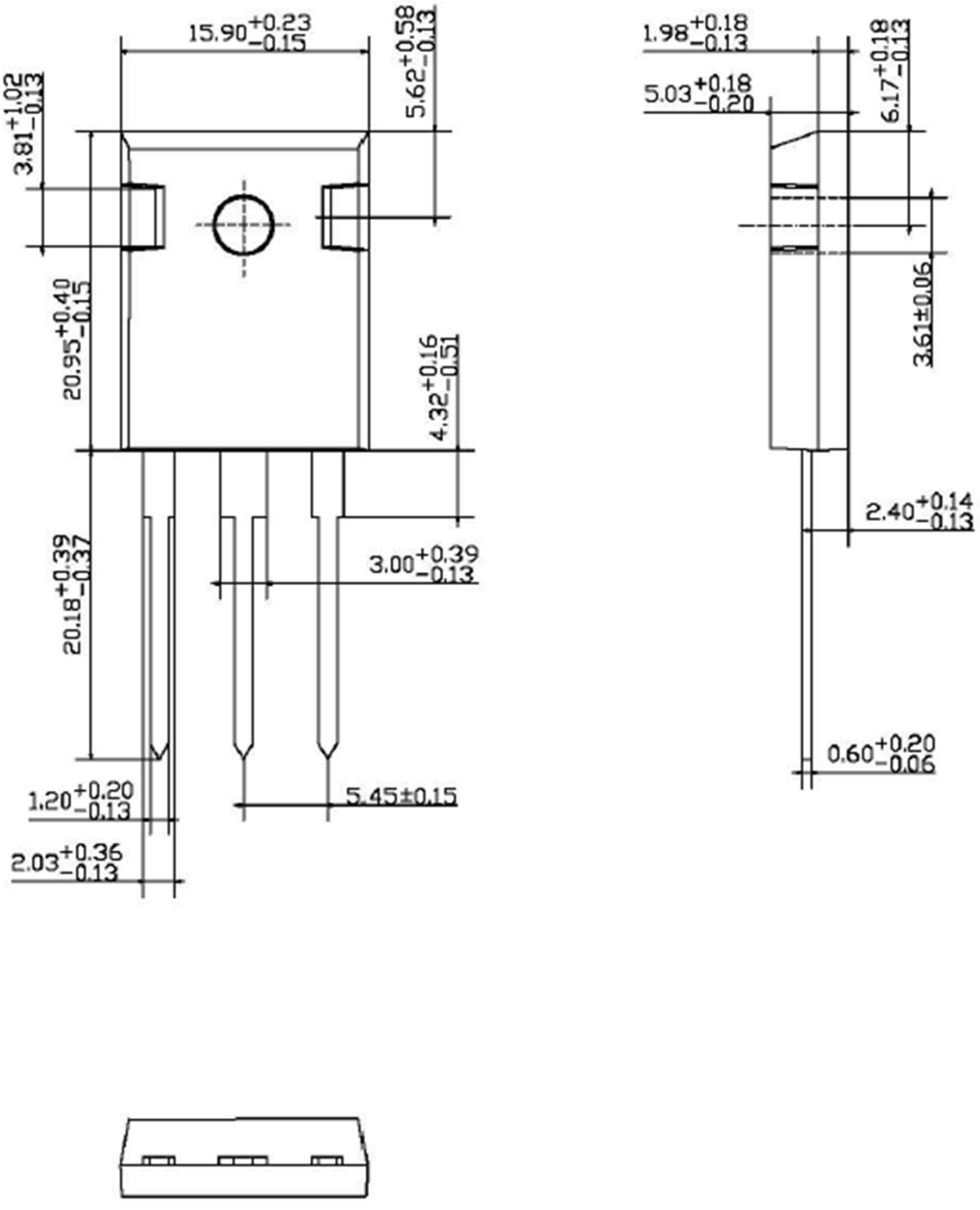


Fig.3-2 di/dt Waveform



●**Dimensions** (Unit : mm)

TO-247



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