

$V_{DSS}$	1200V
$R_{DS(on)}$ (Typ.)	80m $\Omega$
$I_D$	40A
$P_D$	262W

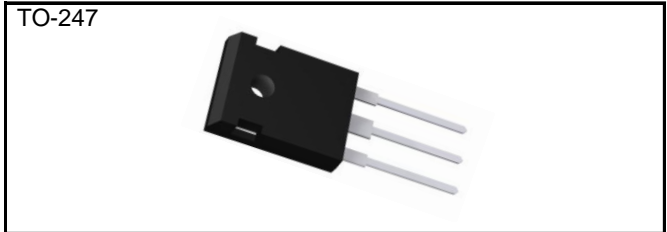
### ●Features

- 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

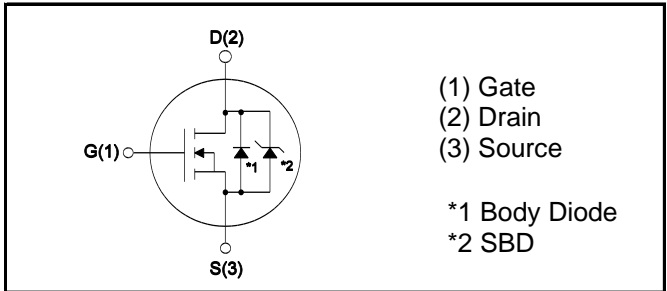
### ●Application

- 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
	Packing code	C
	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	$T_c = 25^\circ\text{C}$	$I_D^{*1}$	40 A
	$T_c = 100^\circ\text{C}$	$I_D^{*1}$	28 A
Pulsed drain current	$I_{D,pulse}^{*2}$	80	A
Gate - Source voltage (DC)	$V_{GSS}$	-6 to 22	V
Gate - Source surge voltage ( $T_{surge} < 300\text{nsec}$ )	$V_{GSS-surge}^{*3}$	-10 to 26	V
Power dissipation ( $T_c = 25^\circ\text{C}$ )	$P_D$	262	W
Junction temperature	$T_j$	175	$^\circ\text{C}$
Range of storage temperature	$T_{stg}$	-55 to +175	$^\circ\text{C}$

### ●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	$R_{thJC}$	-	0.44	0.57	°C/W
Thermal resistance, junction - ambient	$R_{thJA}$	-	-	50	°C/W
Soldering temperature, wavesoldering for 10s	$T_{sold}$	-	-	265	°C

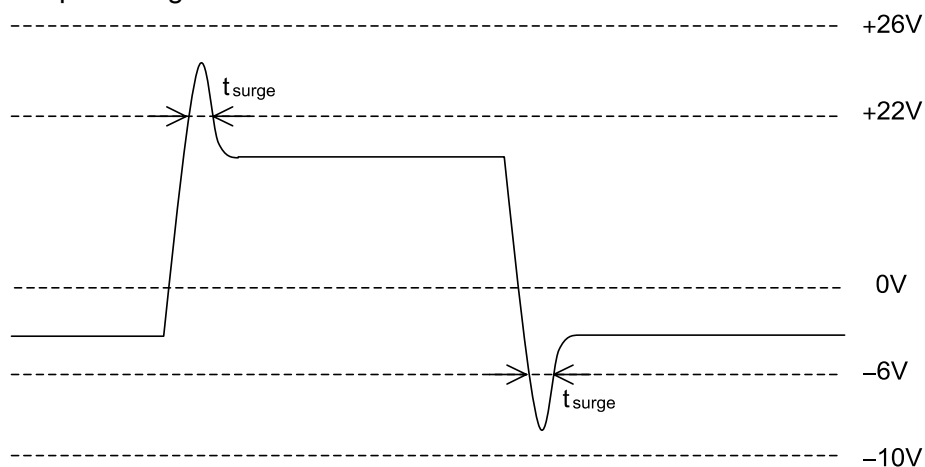
### ●Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

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	$\mu\text{A}$
		$T_j = 150^\circ\text{C}$	-	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	2.8	4.0	V

\*1 Limited only by maximum temperature allowed.

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

\*3 Example of acceptable Vgs waveform



\*4 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Static drain - source on - state resistance	$R_{DS(on)}$ *4	$V_{GS} = 18\text{V}$ , $I_D = 10\text{A}$ $T_j = 25^\circ\text{C}$ $T_j = 125^\circ\text{C}$	-	80 125	117 -	$\text{m}\Omega$
Gate input resistance	$R_G$	$f = 1\text{MHz}$ , open drain	-	6.3	-	$\Omega$
Transconductance	$g_{fs}$ *4	$V_{DS} = 10\text{V}$ , $I_D = 10\text{A}$	-	3.7	-	S
Input capacitance	$C_{iss}$	$V_{GS} = 0\text{V}$	-	1850	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = 800\text{V}$	-	175	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	20	-	
Turn - on delay time	$t_{d(on)}$ *4	$V_{DD} = 400\text{V}$ , $V_{GS} = 18\text{V}$	-	37	-	ns
Rise time	$t_r$ *4	$I_D = 10\text{A}$	-	33	-	
Turn - off delay time	$t_{d(off)}$ *4	$R_L = 40\Omega$	-	70	-	
Fall time	$t_f$ *4	$R_G = 0\Omega$	-	28	-	
Turn - on switching loss	$E_{on}$ *4	$V_{DD} = 600\text{V}$ , $I_D = 10\text{A}$ $V_{GS} = 18\text{V}/0\text{V}$	-	218	-	$\mu\text{J}$
Turn - off switching loss	$E_{off}$ *4	$R_G = 0\Omega$ , $L = 500\mu\text{H}$ * $E_{on}$ includes diode reverse recovery	-	64	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	$Q_g$ *4	$V_{DD} = 400\text{V}$	-	106	-	nC
Gate - Source charge	$Q_{gs}$ *4	$I_D = 10\text{A}$	-	27	-	
Gate - Drain charge	$Q_{gd}$ *4	$V_{GS} = 18\text{V}$	-	31	-	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD} = 400\text{V}$ , $I_D = 10\text{A}$	-	9.7	-	V

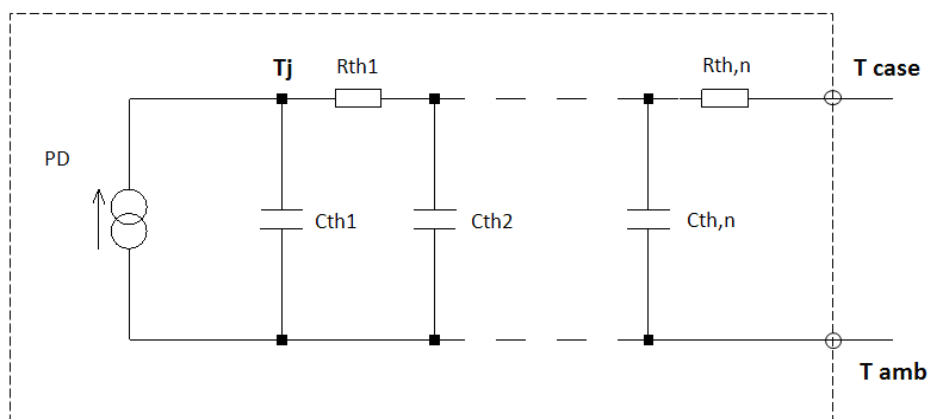
**●Internal diode electrical characteristics (Source-Drain) ( $T_a = 25^\circ\text{C}$ )**

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	$I_S^{*1}$	$T_c = 25^\circ\text{C}$	-	-	40	A
Inverse diode direct current, pulsed	$I_{SM}^{*2}$		-	-	80	A
Forward voltage	$V_{SD}^{*4}$	$V_{GS} = 0\text{V}, I_S = 10\text{A}$	-	1.3	-	V
Reverse recovery time	$t_{rr}^{*4}$	$I_F = 10\text{A}, V_R = 400\text{V}$ $di/dt = 150\text{A}/\mu\text{s}$	-	37	-	ns
Reverse recovery charge	$Q_{rr}^{*4}$		-	60	-	nC
Peak reverse recovery current	$I_{rrm}^{*4}$		-	2.4	-	A

**●Typical Transient Thermal Characteristics**

Symbol	Value	Unit
$R_{th1}$	0.078	K/W
$R_{th2}$	0.197	
$R_{th3}$	0.162	

Symbol	Value	Unit
$C_{th1}$	0.005	Ws/K
$C_{th2}$	0.018	
$C_{th3}$	0.249	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

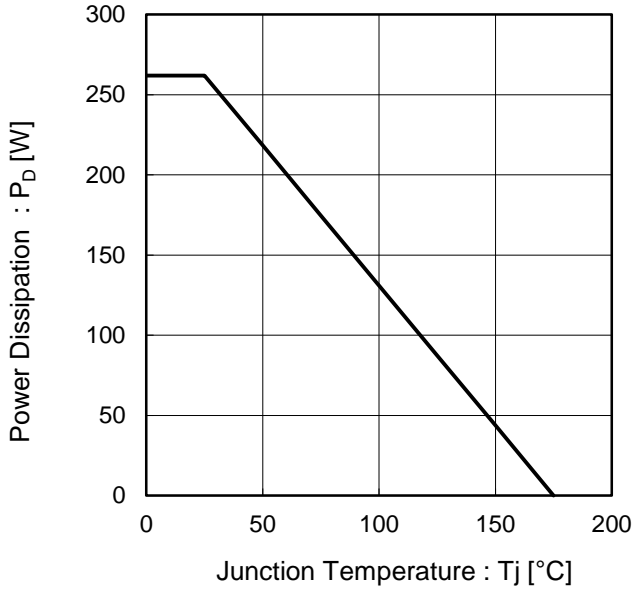


Fig.2 Maximum Safe Operating Area

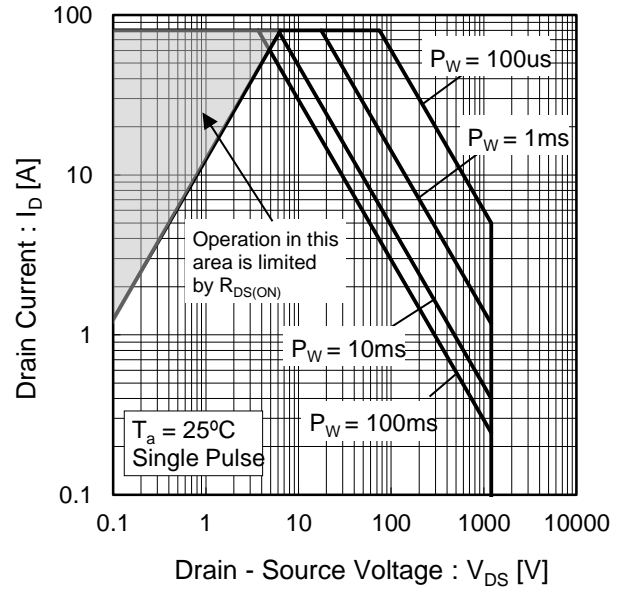
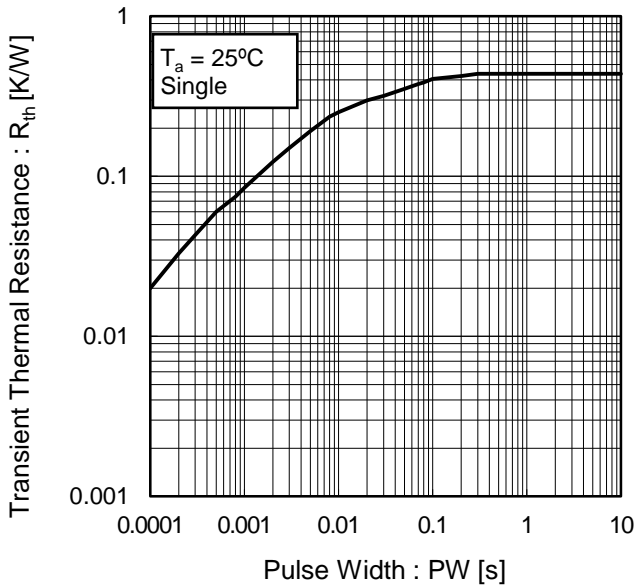


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

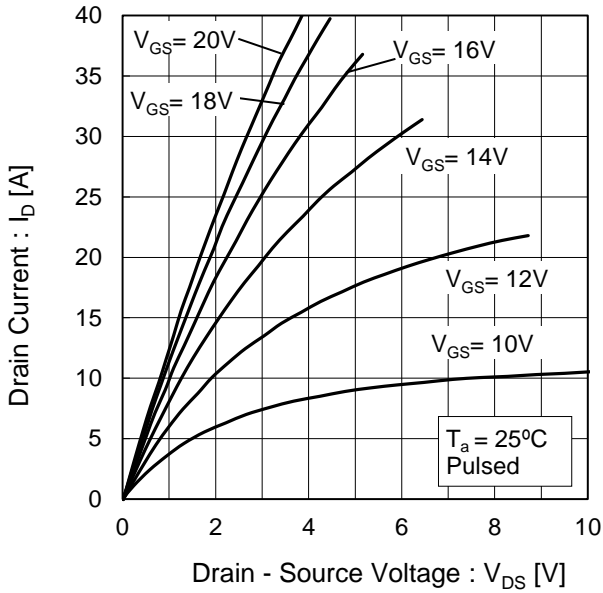


Fig.5 Typical Output Characteristics(II)

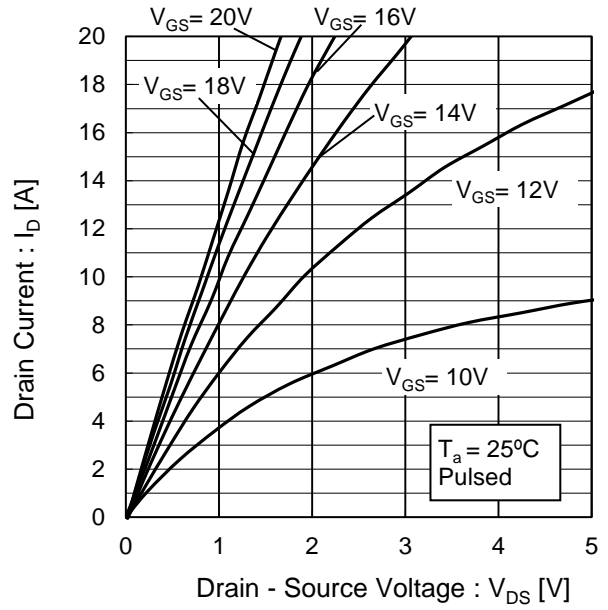


Fig.6 Typical Output Characteristics(I)

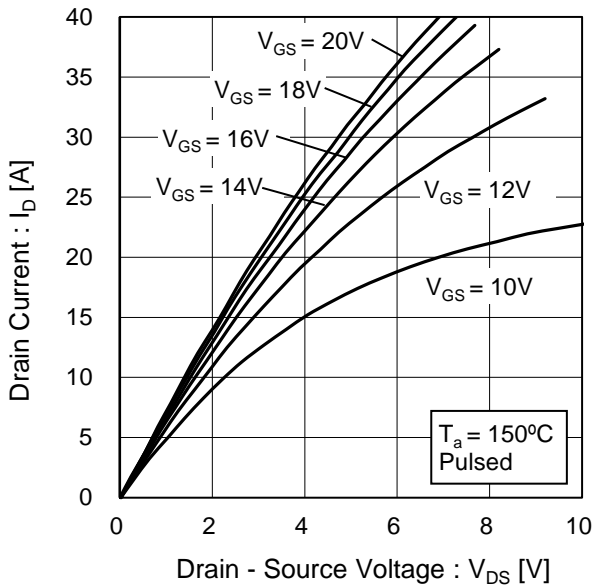
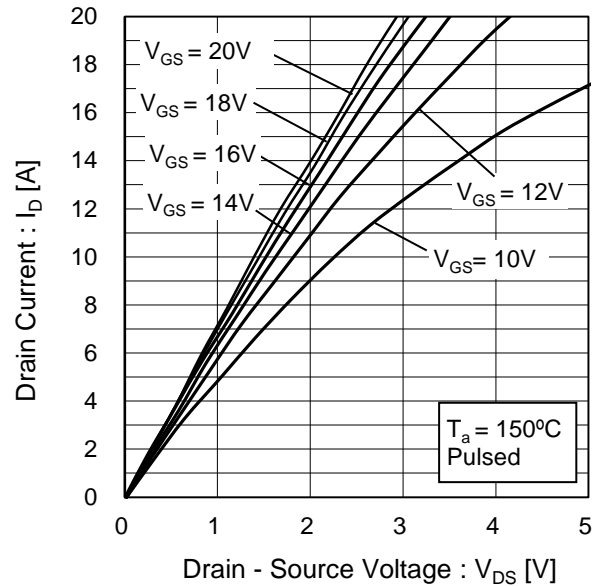


Fig.7 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

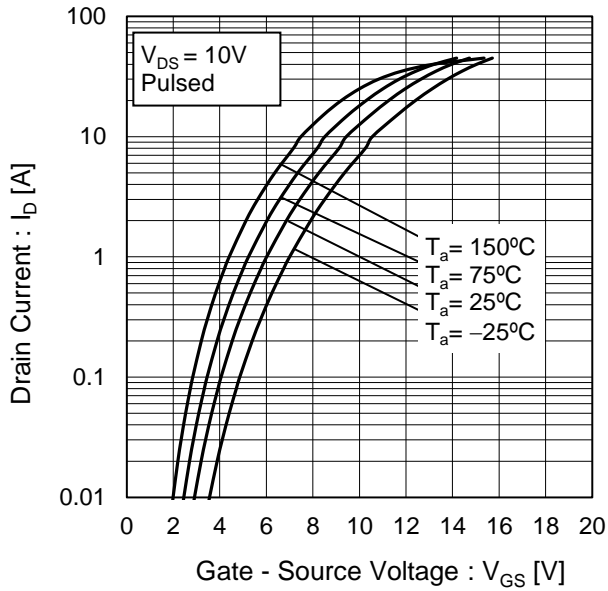


Fig.9 Typical Transfer Characteristics (II)

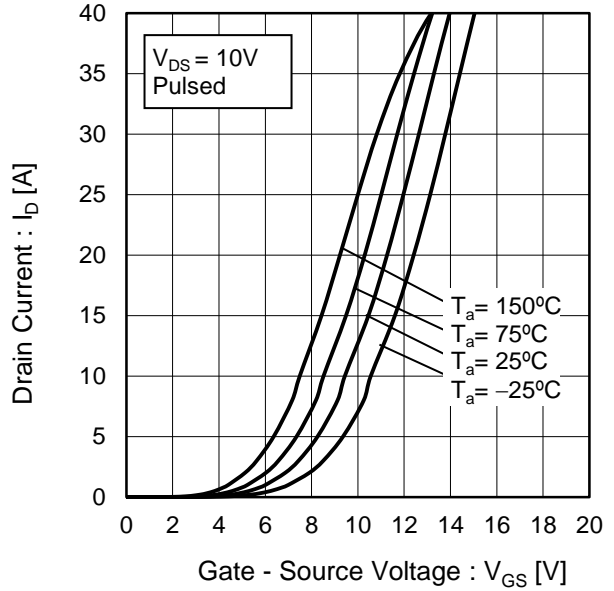


Fig.10 Gate Threshold Voltage vs. Junction Temperature

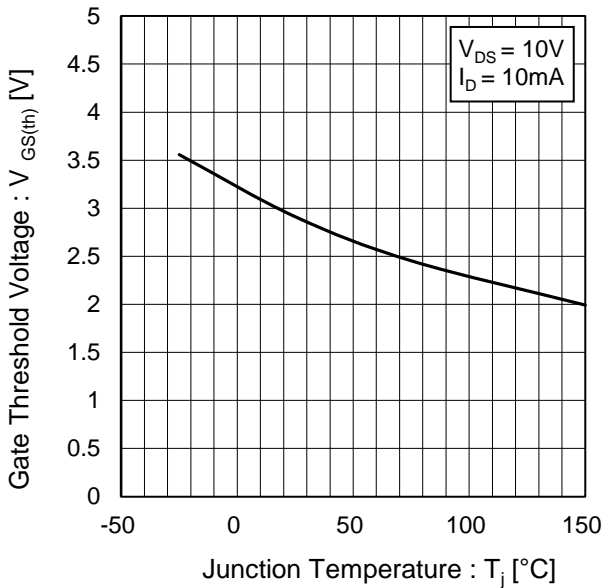
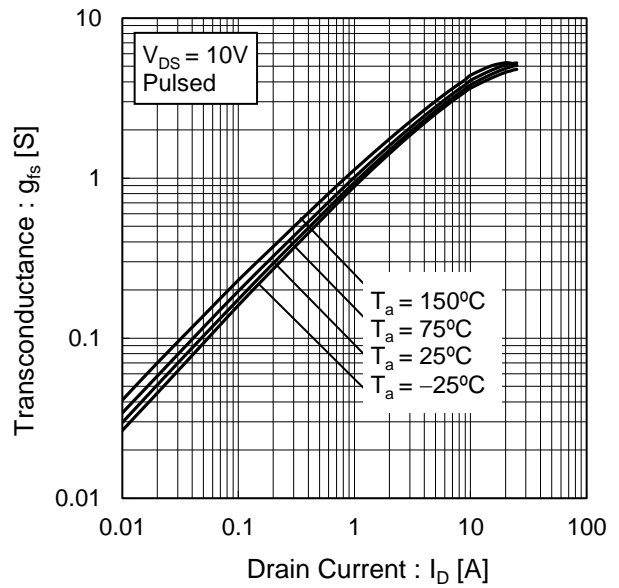


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

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

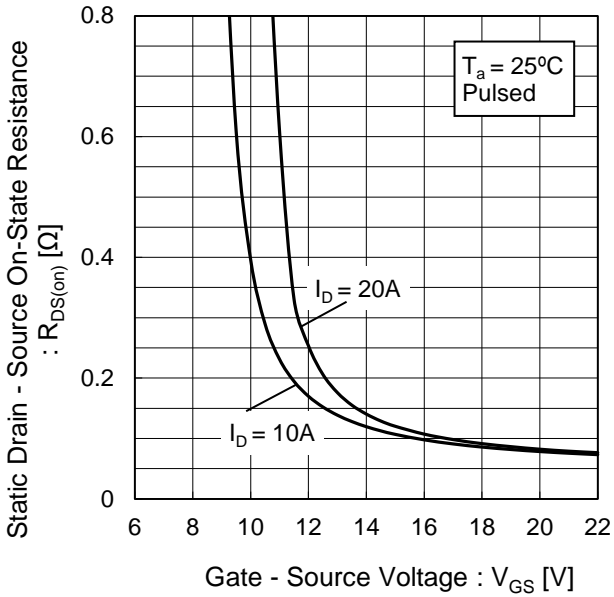


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

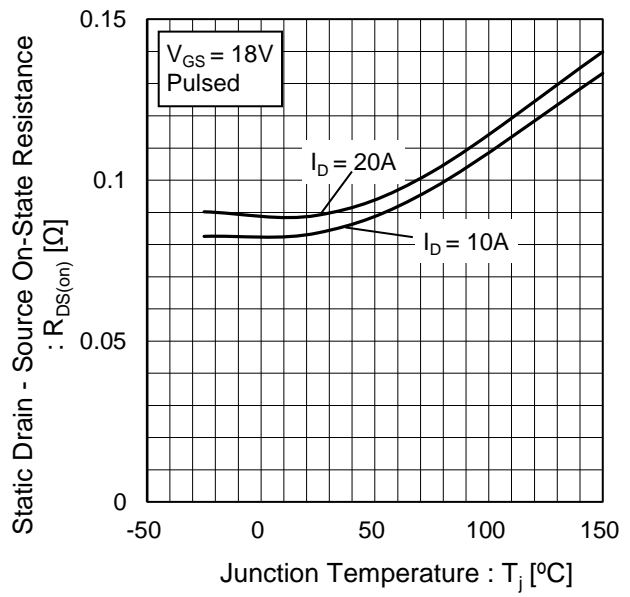
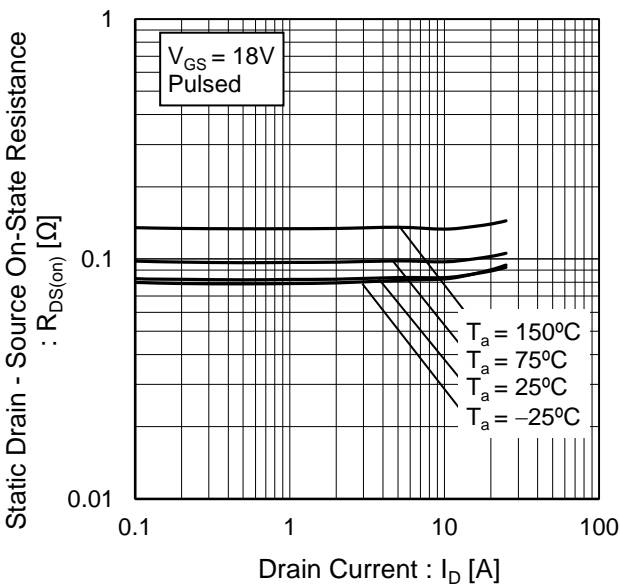


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current





●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

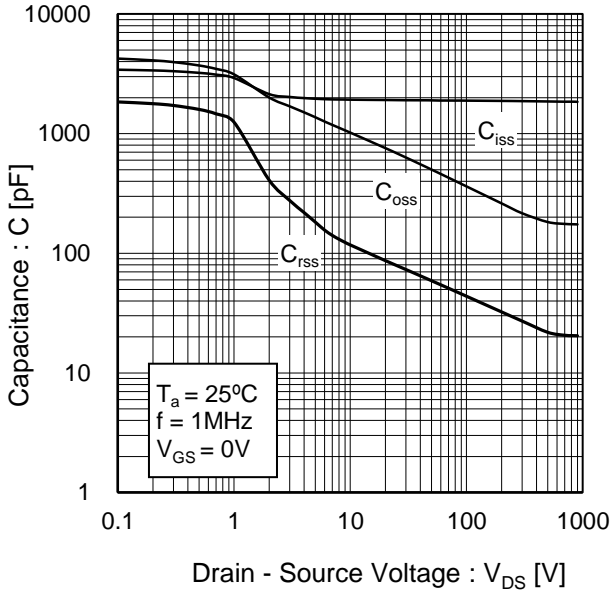


Fig.16 Coss Stored Energy

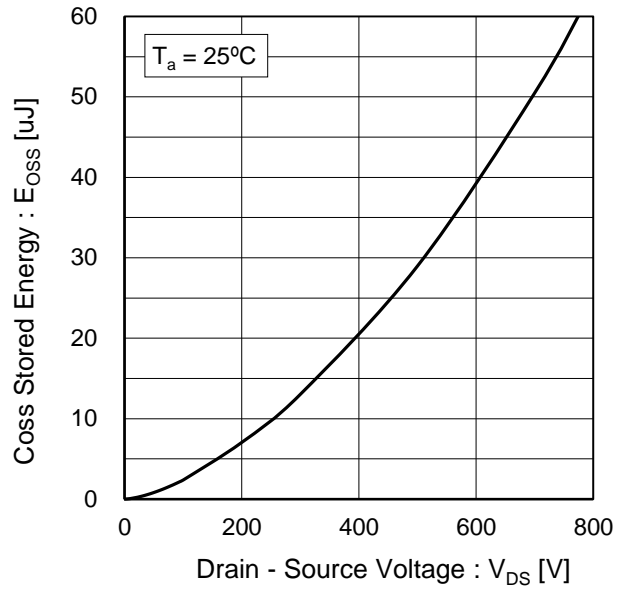


Fig.17 Switching Characteristics

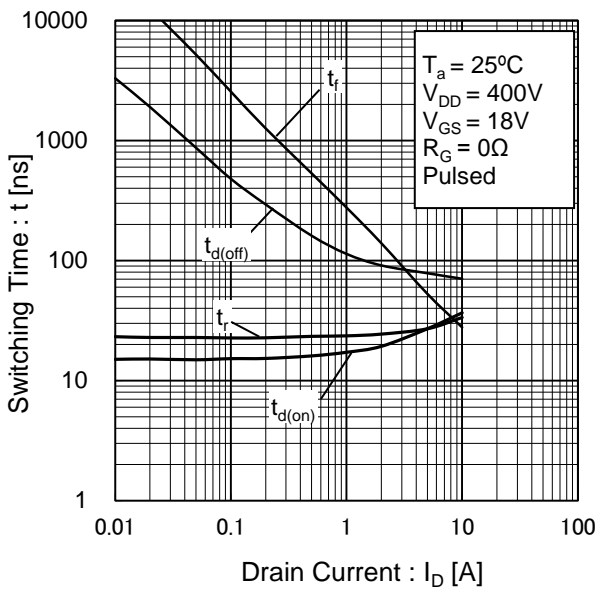
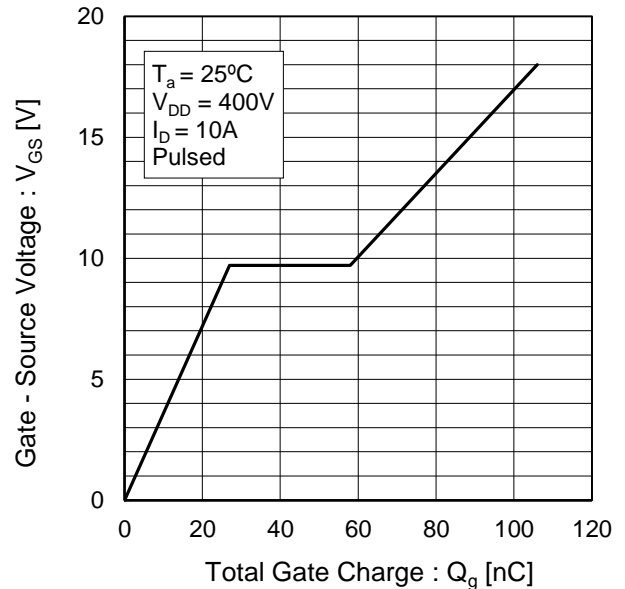


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.19 Typical Switching Loss vs. Drain - Source Voltage

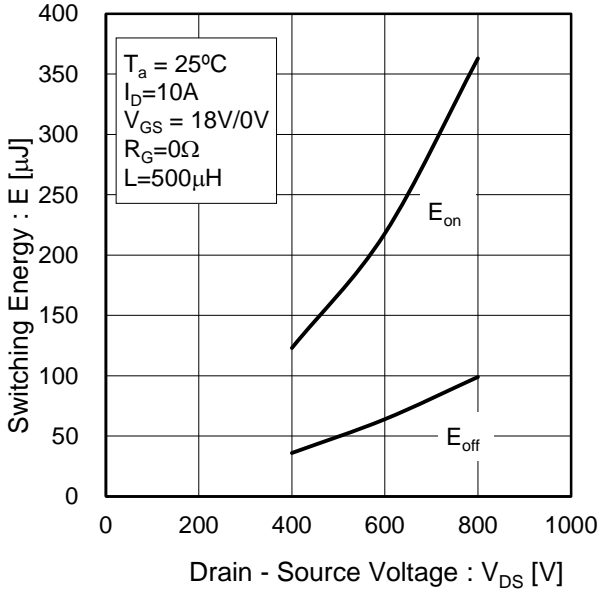


Fig.20 Typical Switching Loss vs. Drain Current

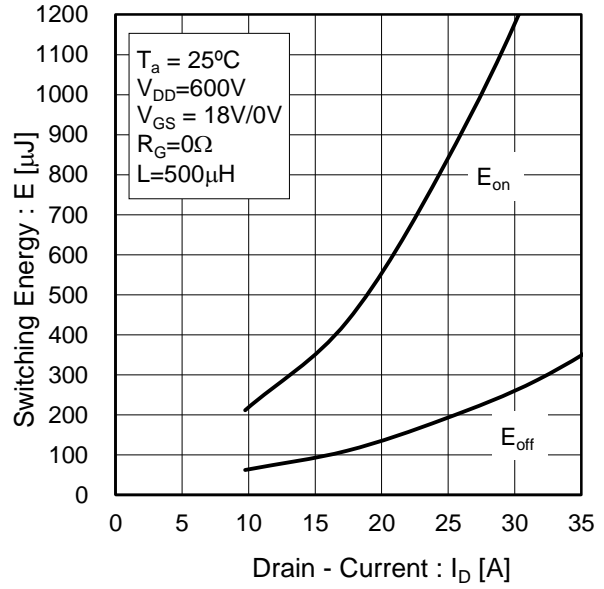
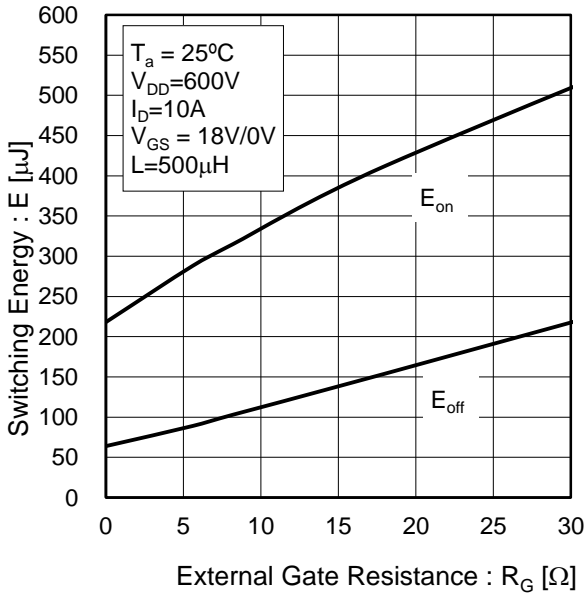


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

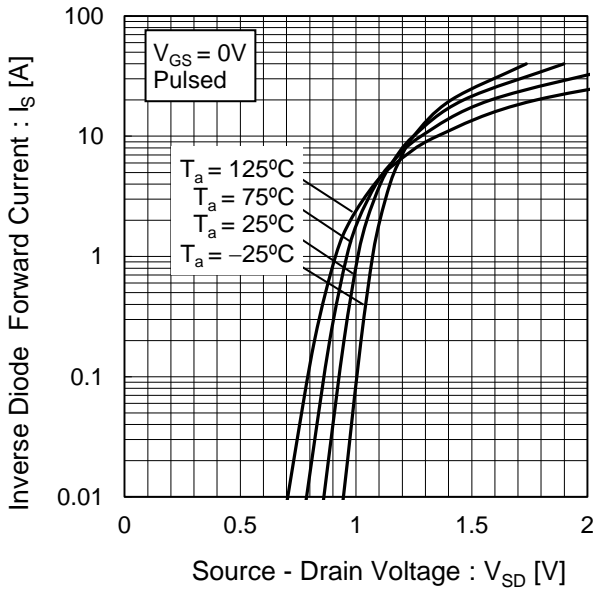
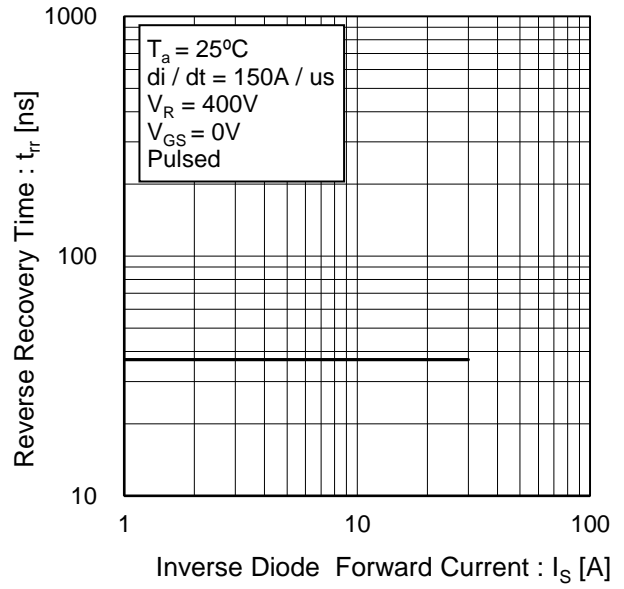


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

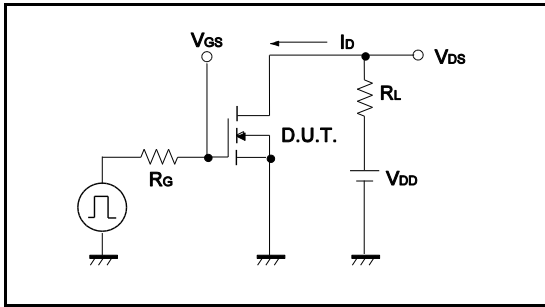


Fig.1-2 Switching Waveforms

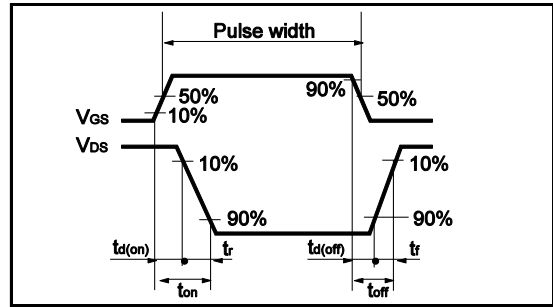


Fig.2-1 Gate Charge Measurement Circuit

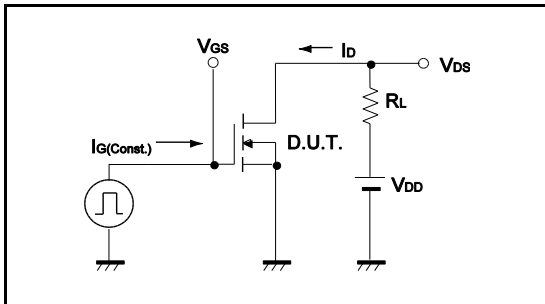


Fig.2-2 Gate Charge Waveform

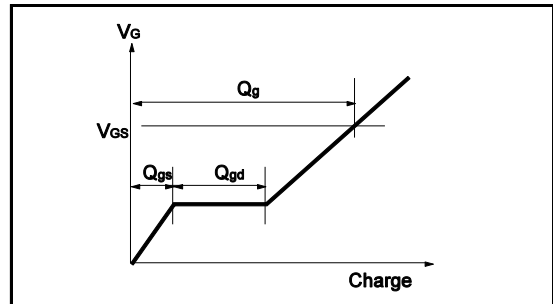


Fig.3-1 Switching Energy Measurement Circuit

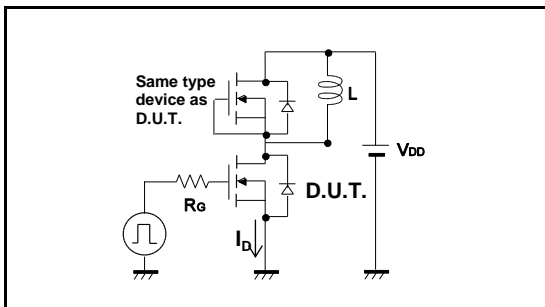


Fig.3-2 Switching Waveforms

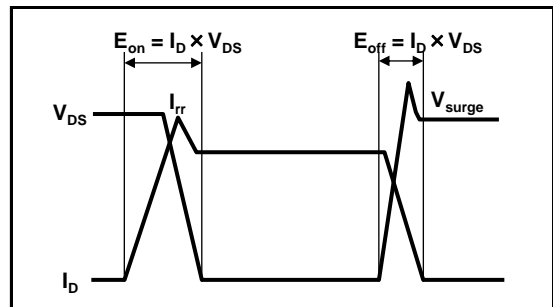


Fig.4-1 Reverse Recovery Time Measurement Circuit

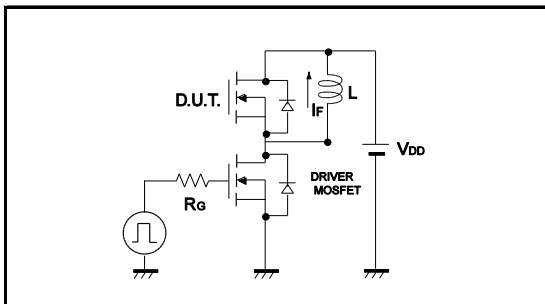
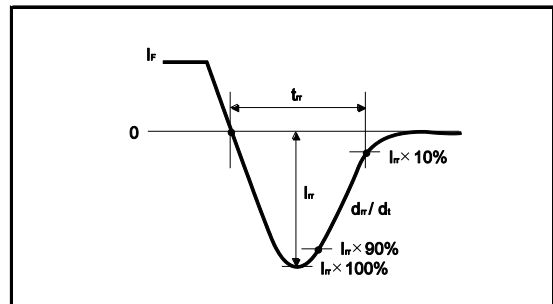
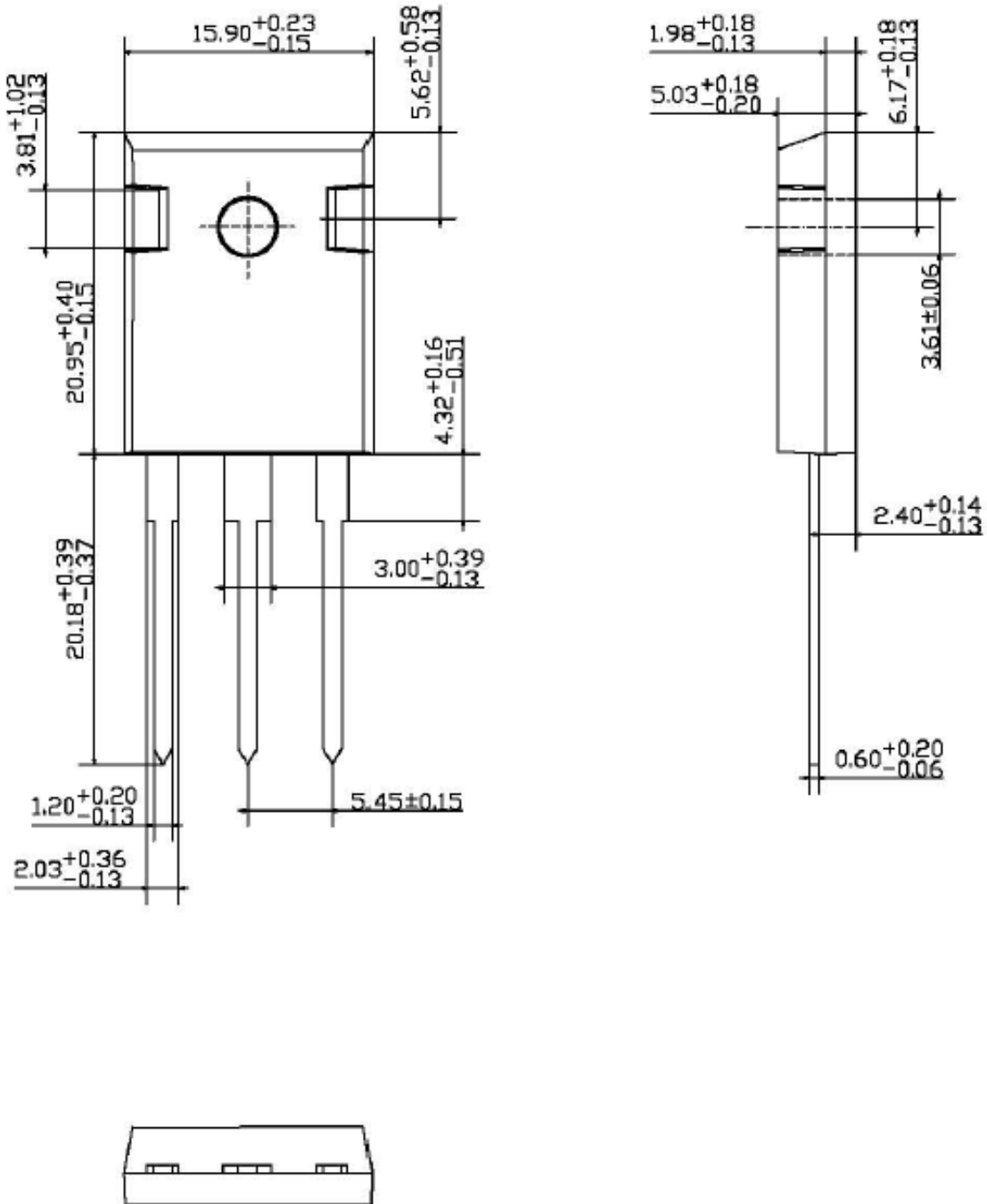


Fig.4-2 Reverse Recovery Waveform



●Dimensions (Unit : mm)

TO-247



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