SCT2H12NZ

N-channel SiC power MOSFET

Datasheet

V_{DSS}	1700V
$R_{DS(on)}$ (Typ.)	1.15Ω
I_D	3.7A
P_D	35W

●Outline

TO-3PFM

●Features

1) Low on-resistance

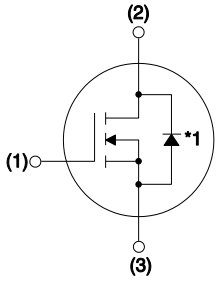
2) Fast switching speed

3) Long creepage distance

4) Simple to drive

5) Pb-free lead plating ; RoHS compliant

●Inner circuit



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

*1 Body Diode

●Application

・Auxilialy power supplies

・Switch mode power supplies

●Packaging specifications

Type	Packing	Tube
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	30
	Taping code	C11
	Marking	SCT2H12NZ

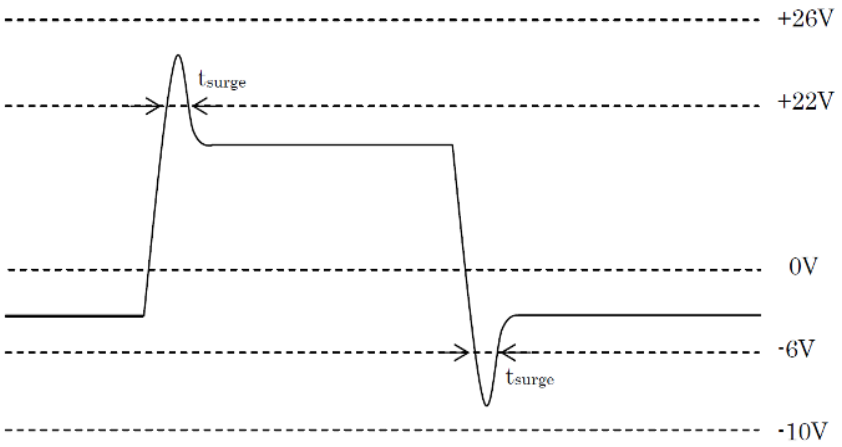
●Absolute maximum ratings (T_{vj} = 25°C unless otherwise spesified)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	1700	V
Continuous drain current	T_c = 25°C	I_D *1	3.7	A
	T_c = 100°C	I_D *1	2.6	A
Pulsed drain current		$I_{D,pulse}$ *2	9.2	A
Gate - Source voltage (DC)		V_{GSS}	-6 to 22	V
Gate - Source surge voltage (t_{surge}<300nsec)		V_{GSS_surge} *3	-10 to 26	V
Power dissipation (T_c = 25°C)		P_D	35	W
Virtual Junction temperature		T_{vj}	175	°C
Range of storage temperature		T_{stg}	-55 to +175	°C

●**Electrical characteristics** (T_{vj} = 25°C unless otherwise spesified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	1700	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 1700V, V_{GS} = 0V				μA
		T_{vj} = 25°C	-	0.1	10	
		T_{vj} = 150°C	-	0.2	-	
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 = 0.41mA	1.6	2.8	4.0	V

*1 Limited by maximum T_{vj} and for Max. R_{thJC}.
*2 PW ≤ 10μs, Duty cycle ≤ 1%
*3 Example of acceptable V_{GS} waveform



*4 Pulsed

●Electrical characteristics (T_{vj} = 25°C unless otherwise spesified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS} = 18V, I_D = 1.1A T_{vj} = 25°C T_{vj} = 125°C	- -	1.15 1.71	1.50 -	Ω
Gate input resistance	R_G	f = 1MHz, open drain	-	64	-	Ω
Transconductance	g_{fs} *4	V_{DS} = 10V, I_D = 1.1A	-	0.4	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	184	-	pF
Output capacitance	C_{oss}	V_{DS} = 800V	-	16	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	6	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 800V	-	17	-	pF
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} = 500V, I_D = 1.1A	-	16	-	ns
Rise time	t_r *4	V_{GS} = 18V/0V	-	21	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 455Ω	-	35	-	
Fall time	t_f *4	R_G = 0Ω	-	74	-	
Turn - on switching loss	E_{on} *4	V_{DD} = 800V, I_D=1.1A V_{GS} = 18V/0V R_G = 0Ω, L=2mH *E_{on} includes diode reverse recovery	-	57	-	μJ
Turn - off switching loss	E_{off} *4		-	32	-	

●Gate Charge characteristics (T_{vj} = 25°C unless otherwise spesified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	V_{DD} = 500V	-	14	-	nC
Gate - Source charge	Q_{gs} *4	I_D = 1A	-	4	-	
Gate - Drain charge	Q_{gd} *4	V_{GS} = 18V	-	5	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} = 500V, I_D = 1A	-	10.5	-	V

●Body diode electrical characteristics (Source-Drain) (T_{vj} = 25°C unless otherwise spesified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	3.7	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	9.2	A
Forward voltage	V_{SD} *4	V_{GS} = 0V, I_S = 1.1A	-	4.3	-	V
Reverse recovery time	t_{rr} *4	I_F = 1.1A, V_R = 800V di/dt = 300A/µs	-	21	-	ns
Reverse recovery charge	Q_{rr} *4		-	13	-	nC
Peak reverse recovery current	I_{rrm} *4		-	1.1	-	A

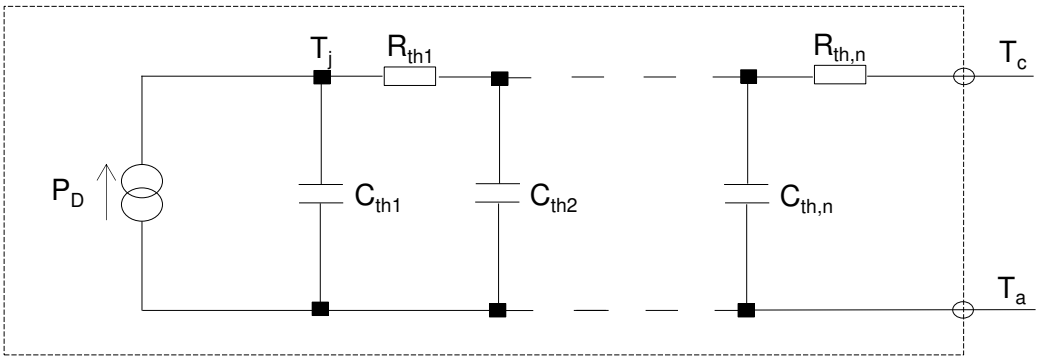
●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - case	R_{thJC}	-	3.32	4.32	K/W

●Typical Transient Thermal Characteristics

Symbol	Value	Unit
R_{th1}	816m	K/W
R_{th2}	1939m	
R_{th3}	567m	

Symbol	Value	Unit
C_{th1}	127µ	Ws/K
C_{th2}	1.64m	
C_{th3}	64.5m	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

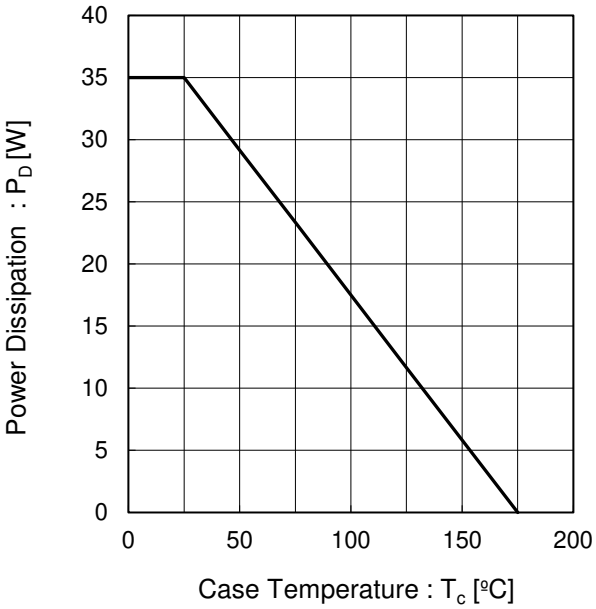


Fig.2 Maximum Safe Operating Area

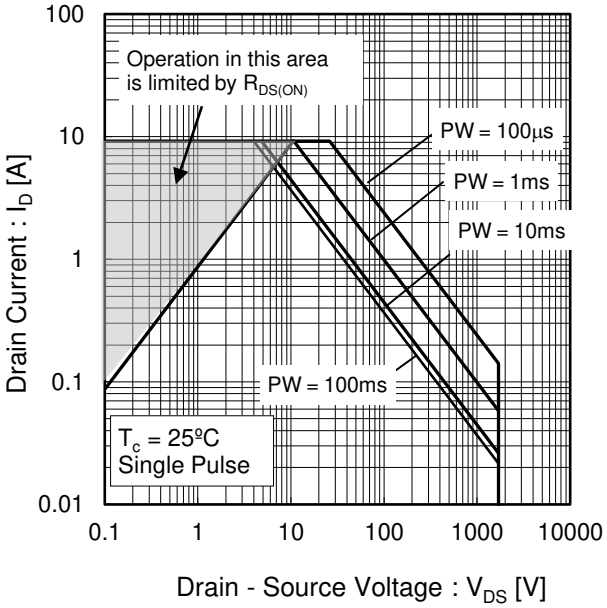
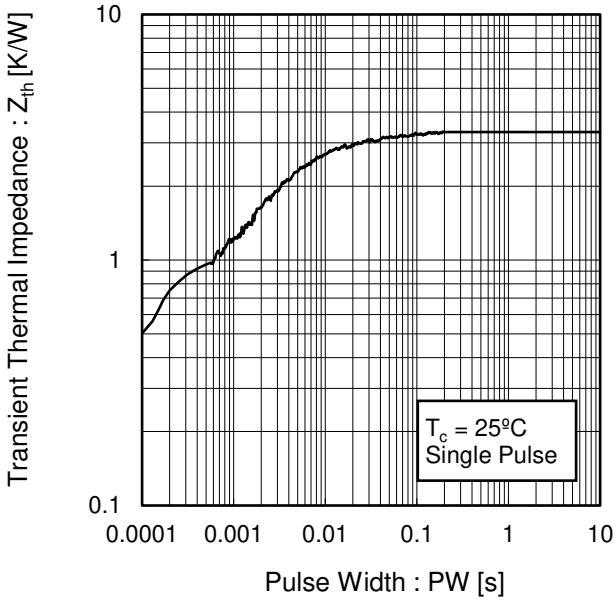


Fig.3 Typical Transient Thermal Impedance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

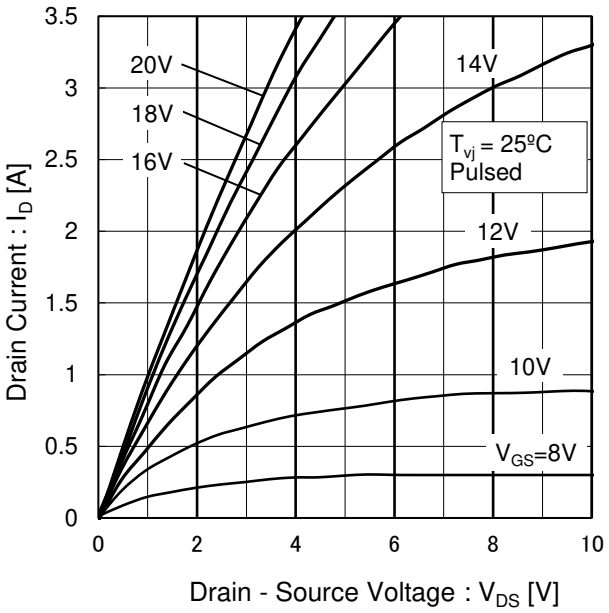


Fig.5 Typical Output Characteristics(II)

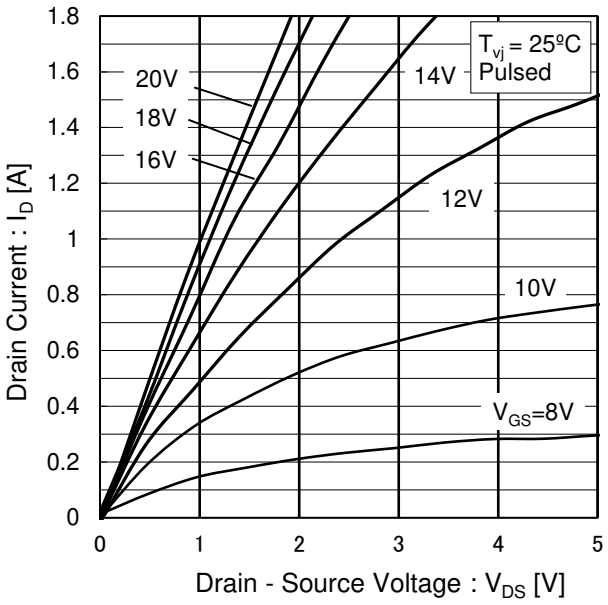


Fig.6 T_{vj} = 150ºC Typical Output Characteristics(I)

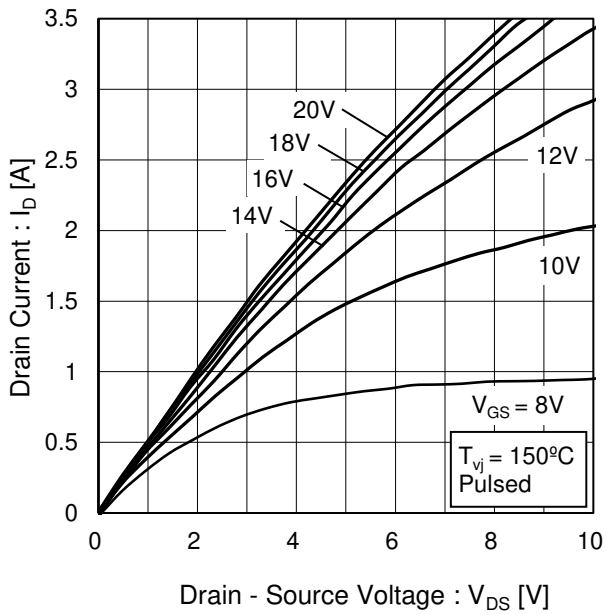
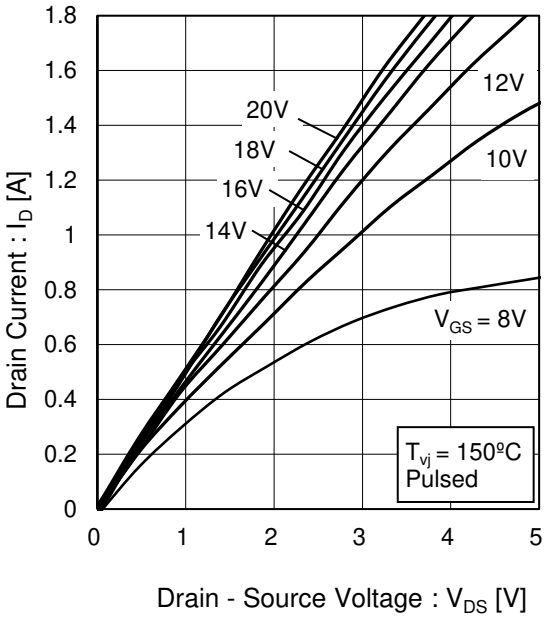


Fig.7 T_{vj} = 150ºC Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics (I)

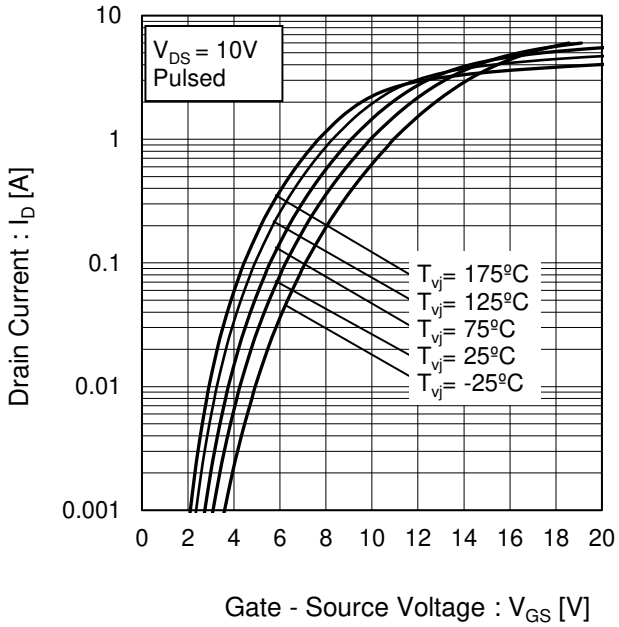


Fig.9 Typical Transfer Characteristics (II)

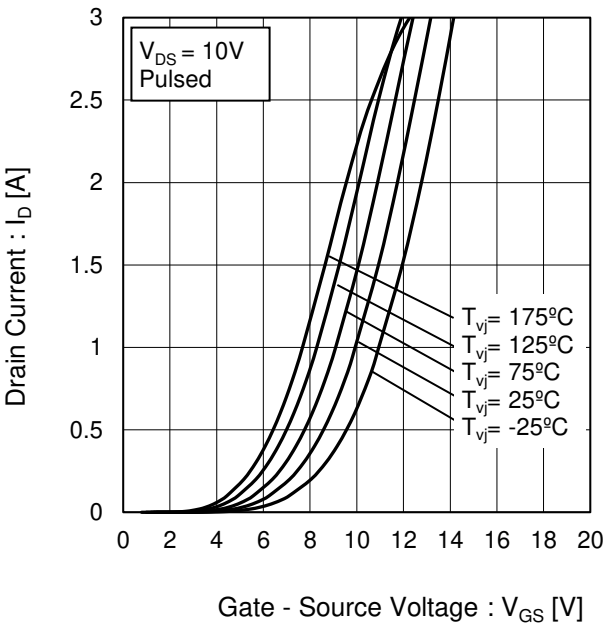


Fig.10 Gate Threshold Voltage vs. Virtual Junction Temperature

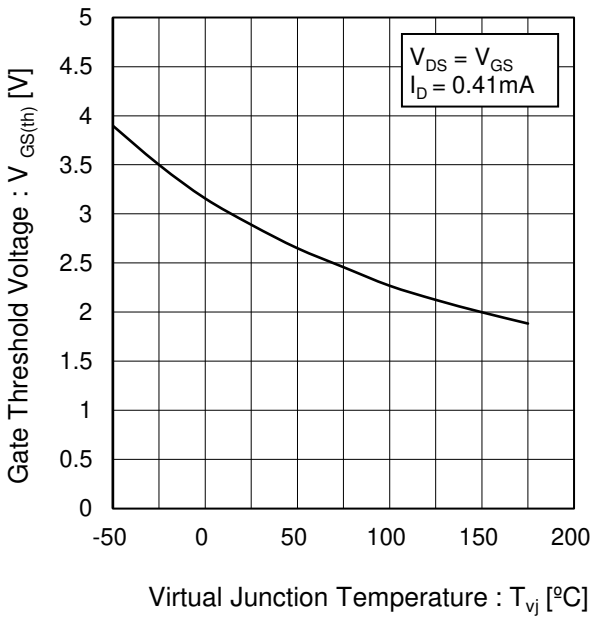
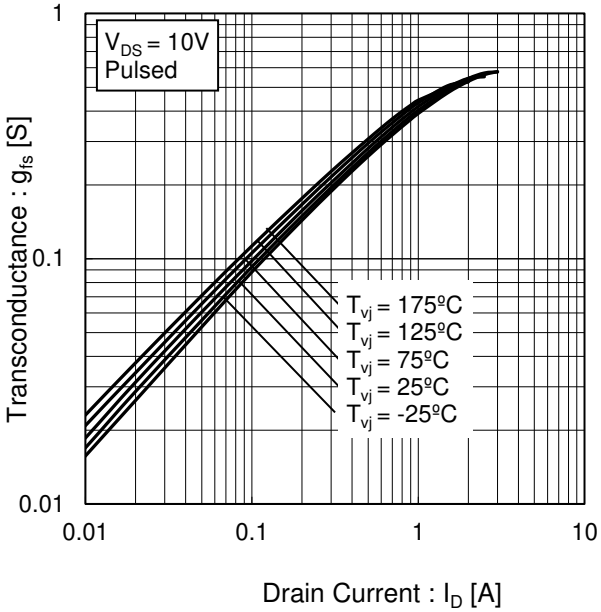


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

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

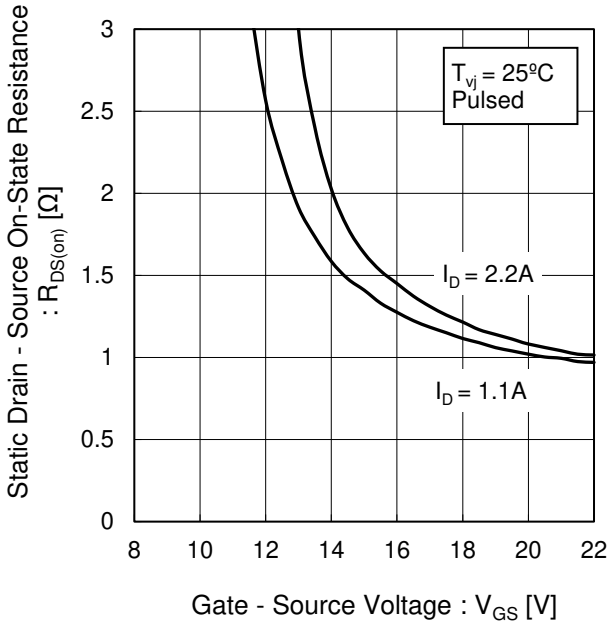


Fig.13 Static Drain - Source On - State Resistance vs. Virtual Junction Temperature

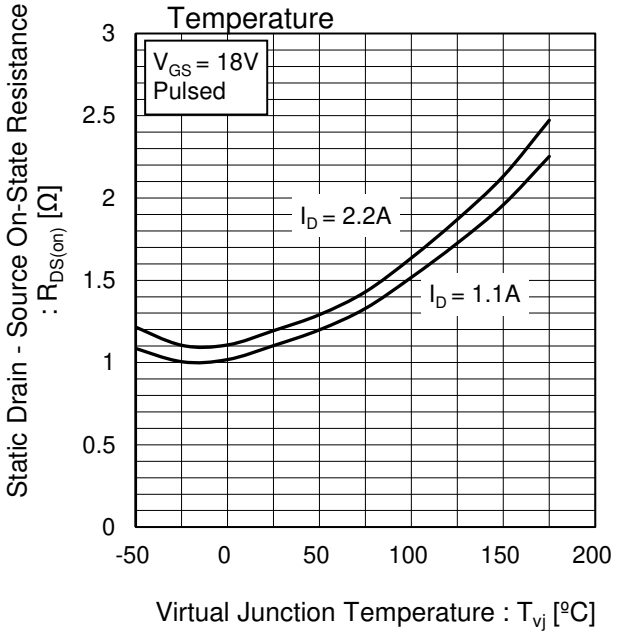
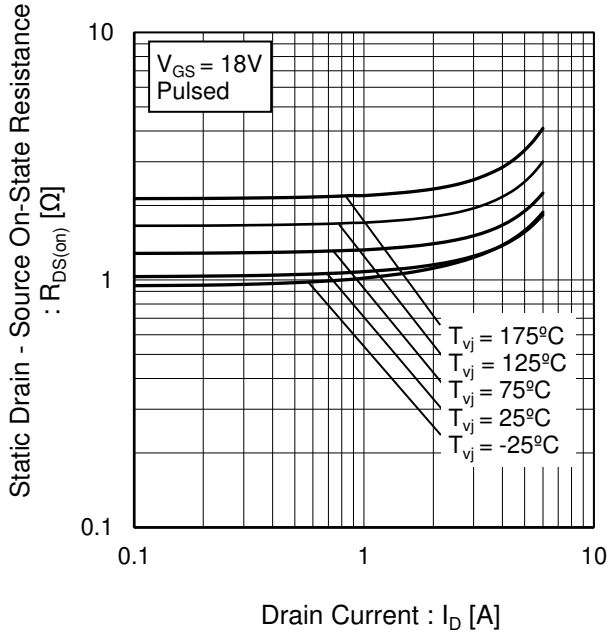


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

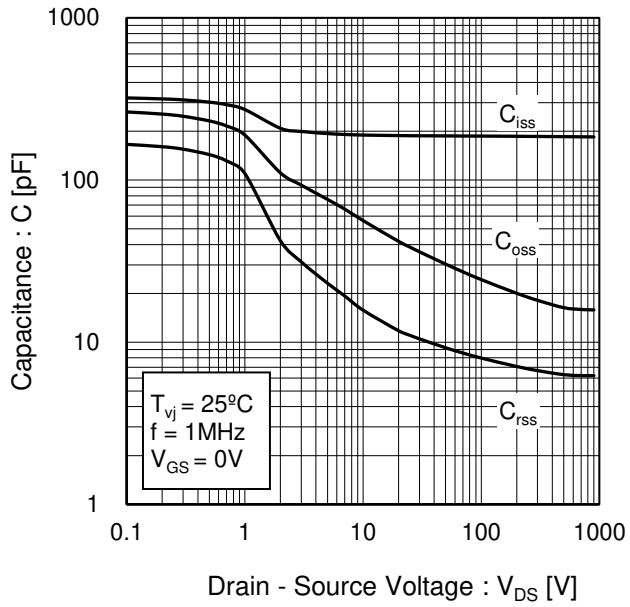


Fig.16 Coss Stored Energy

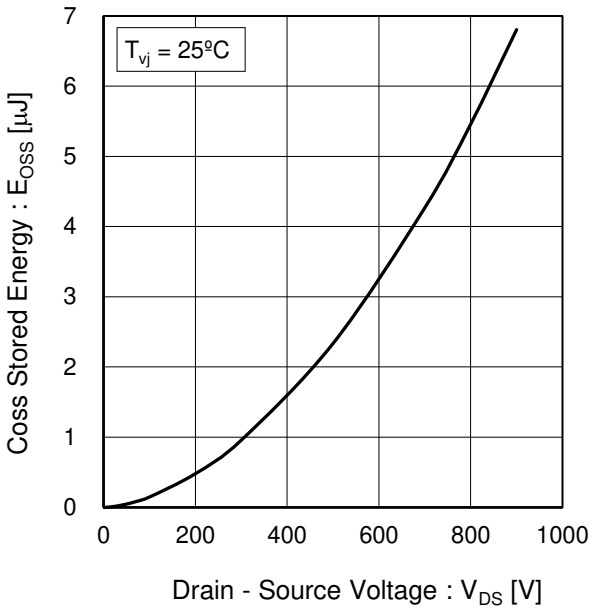


Fig.17 Switching Characteristics

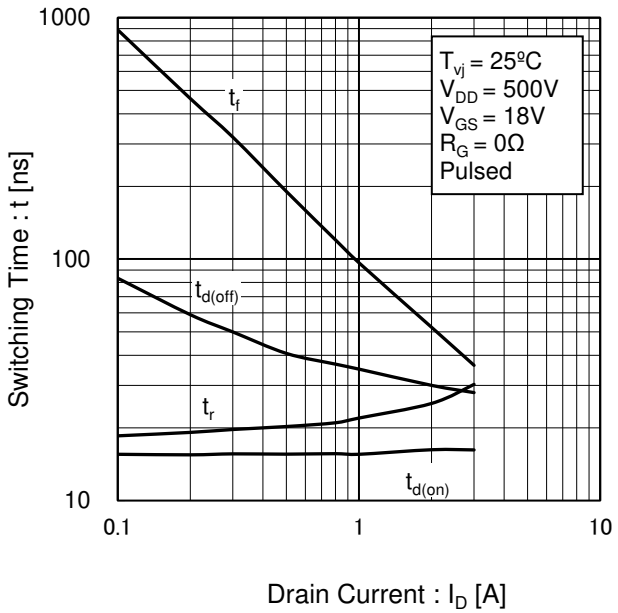
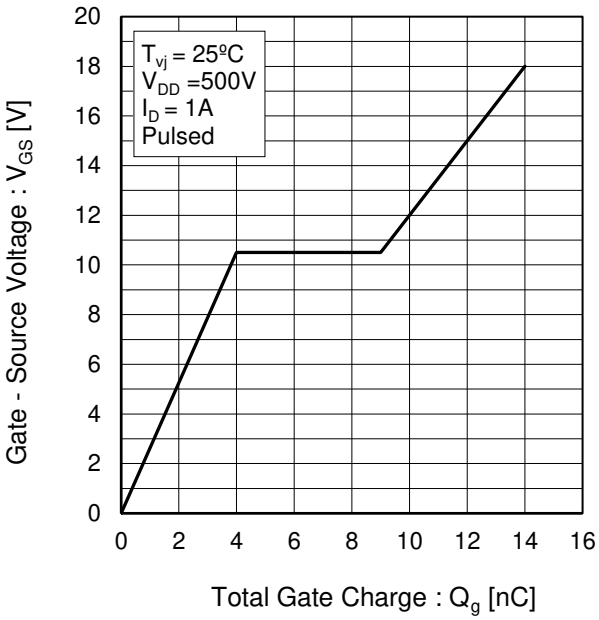


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

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

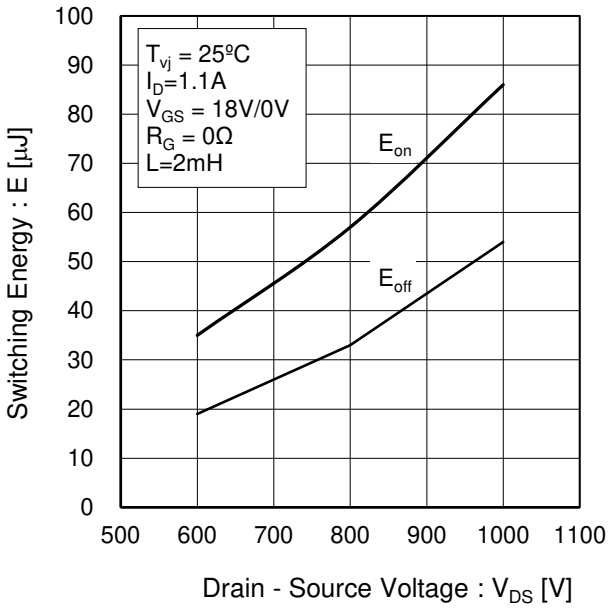


Fig.20 Typical Switching Loss vs. Drain Current

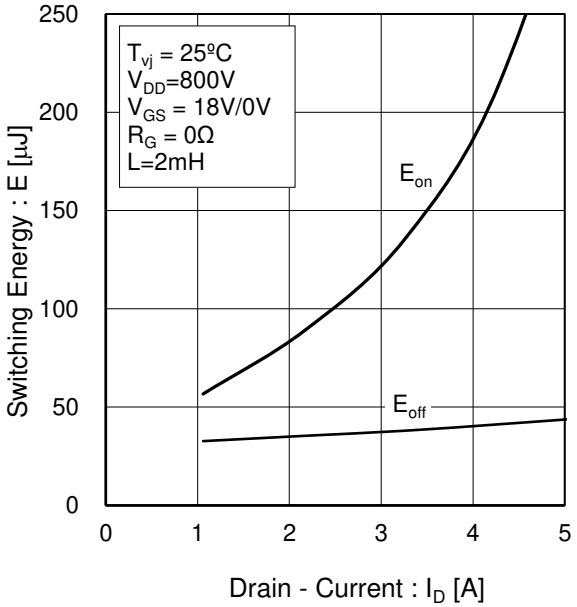
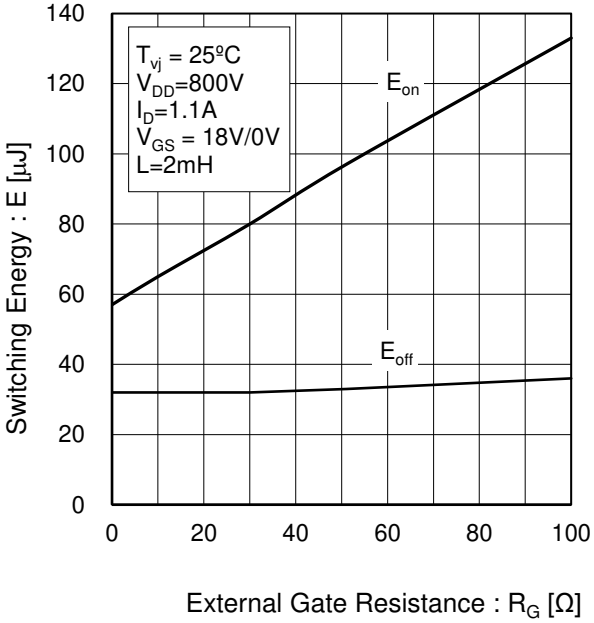


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

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

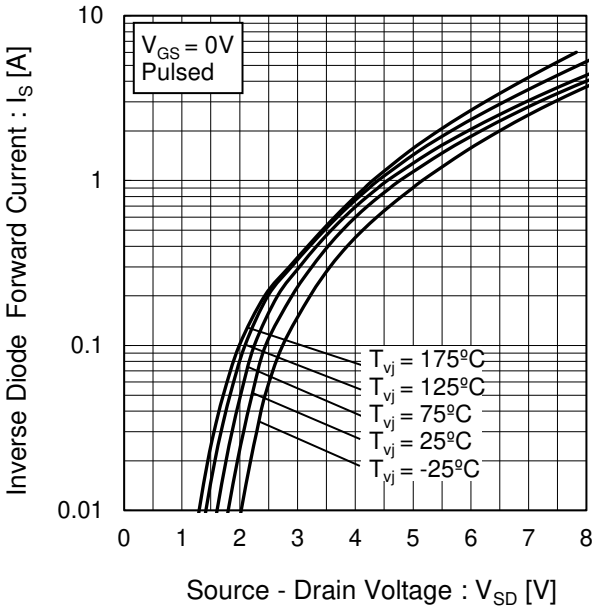
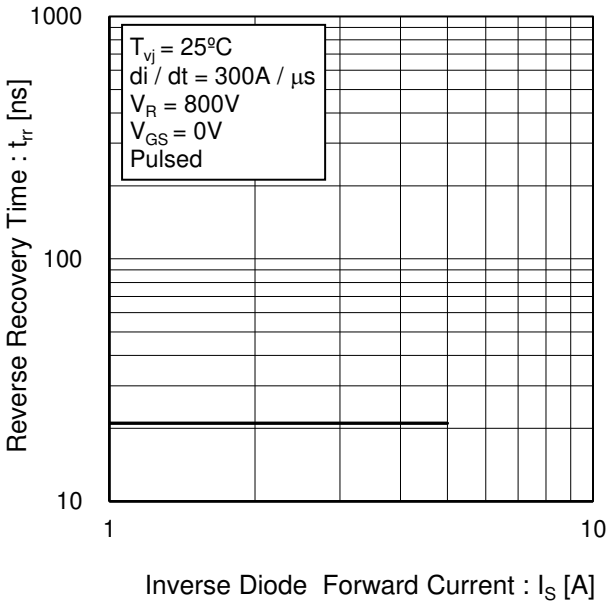


Fig.23 Reverse Recovery Time vs.Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

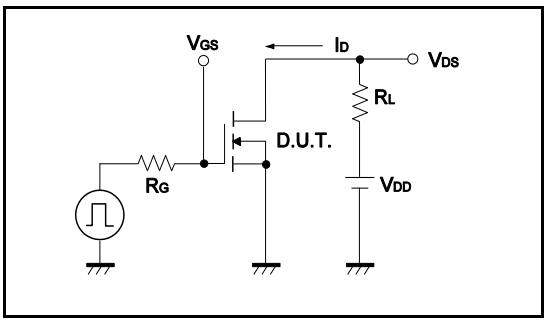


Fig.1-2 Switching Waveforms

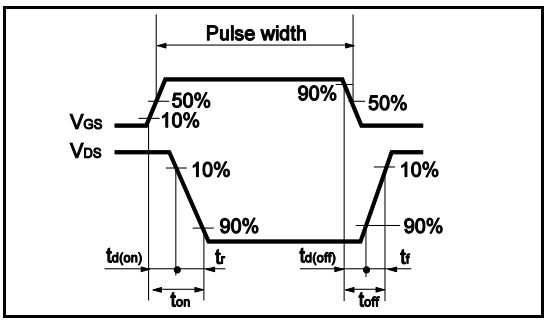


Fig.2-1 Gate Charge Measurement Circuit

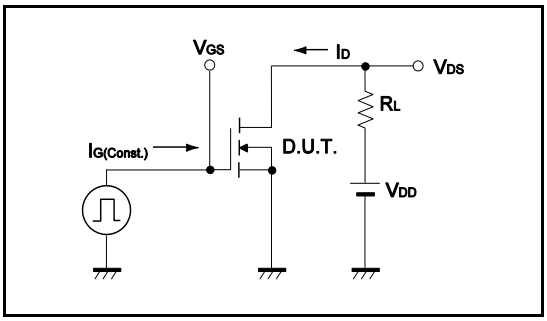


Fig.2-2 Gate Charge Waveform

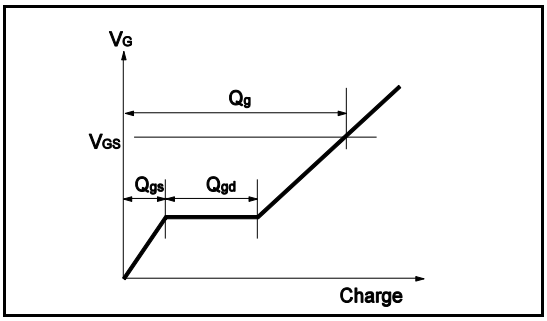


Fig.3-1 Switching Energy Measurement Circuit

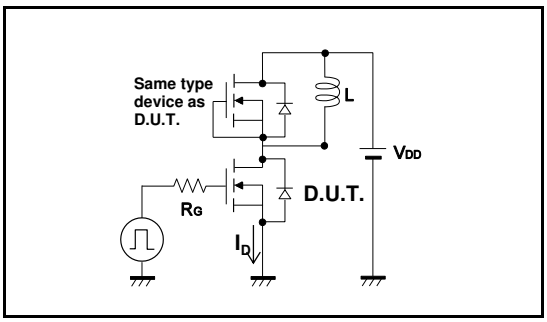


Fig.3-2 Switching Waveforms

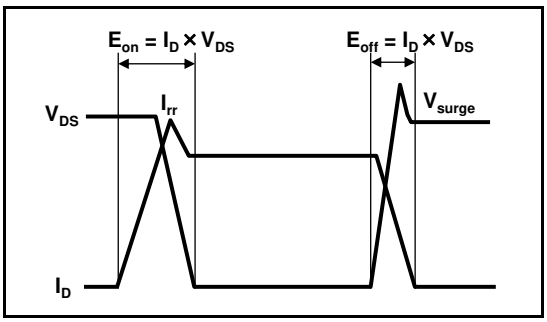


Fig.4-1 Reverse Recovery Time Measurement Circuit

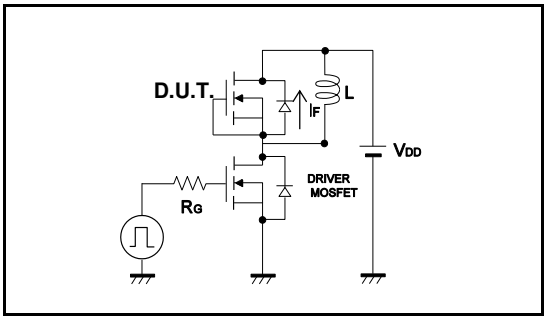
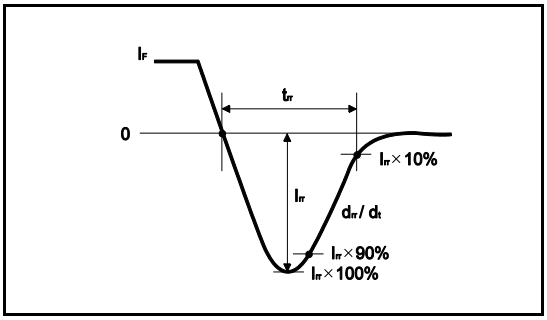
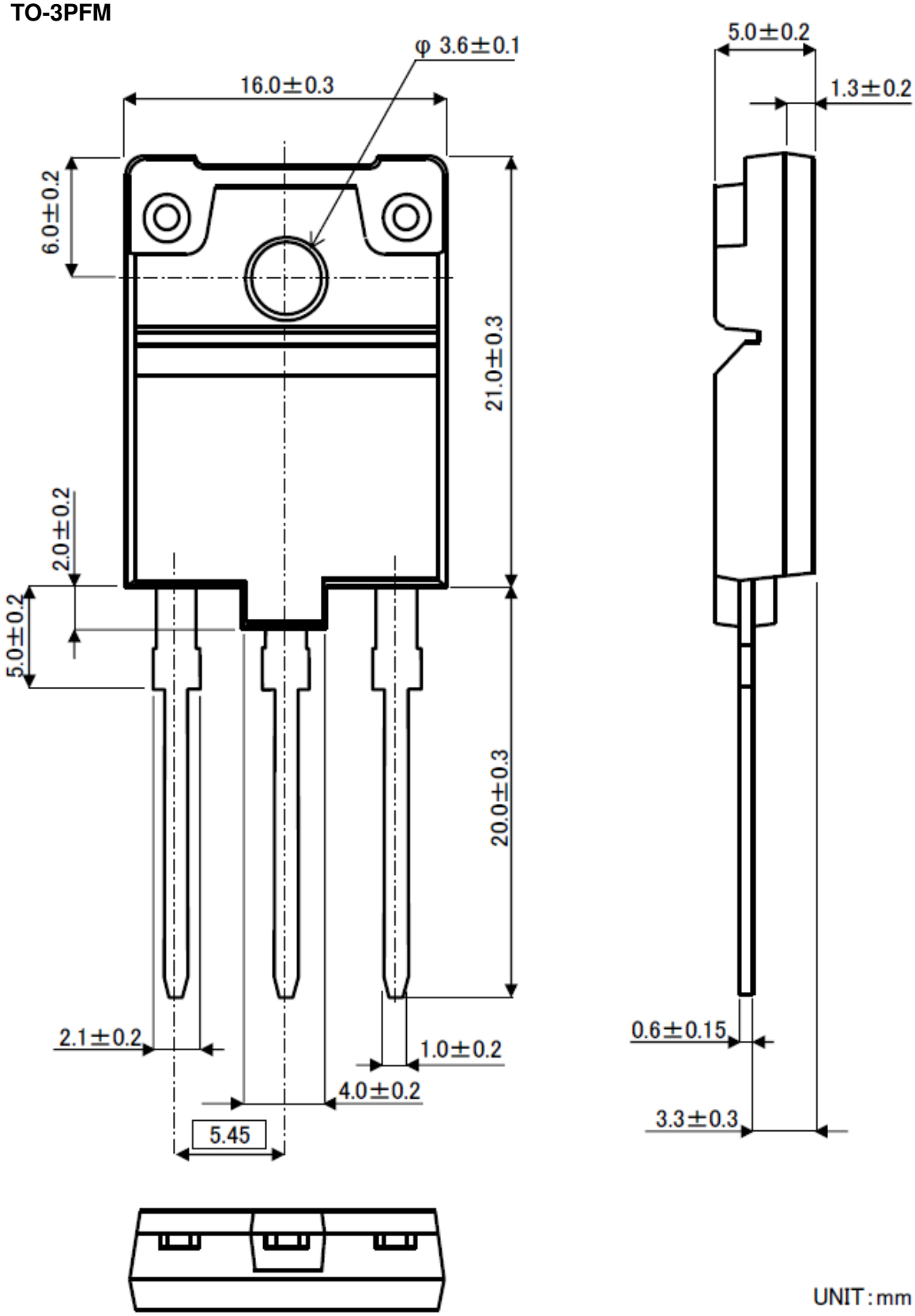


Fig.4-2 Reverse Recovery Waveform



●Package Dimensions

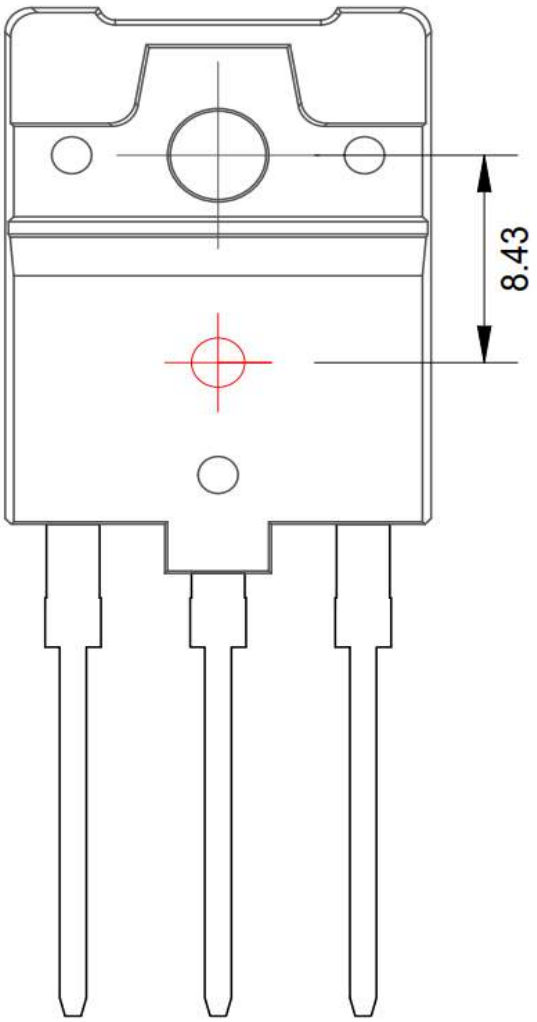
TO-3PFM



UNIT : mm

●Die Bonding Layout

: Die position



・Front view of the packaging.

・Dimensions are design values.

・If the heat sink is to be installed, it should be in contact with the die bonding point.

Unit: mm

Notes

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