

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

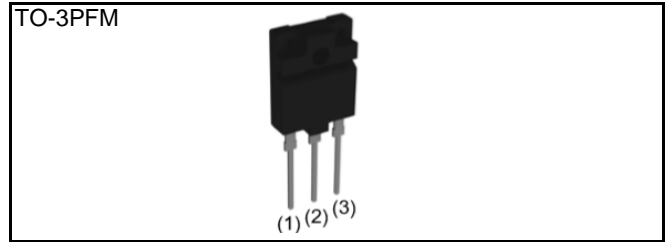
### ●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Long creepage distance
- 4) Simple to drive
- 5) Pb-free lead plating ; RoHS compliant

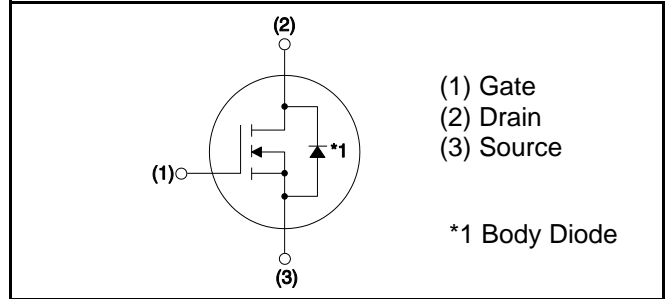
### ●Application

- Auxiliary power supplies
- Switch mode power supplies

### ●Outline



### ●Inner circuit



### ●Packaging specifications

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

### ●Absolute maximum ratings ( $T_{vj} = 25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	1700	V
Continuous drain current	$T_c = 25^{\circ}C$	$I_D^{*1}$ 3.7	A
	$T_c = 100^{\circ}C$	$I_D^{*1}$ 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 ( $T_c = 25^{\circ}C$ )	$P_D$	35	W
Virtual Junction temperature	$T_{vj}$	175	$^{\circ}C$
Range of storage temperature	$T_{stg}$	-55 to +175	$^{\circ}C$

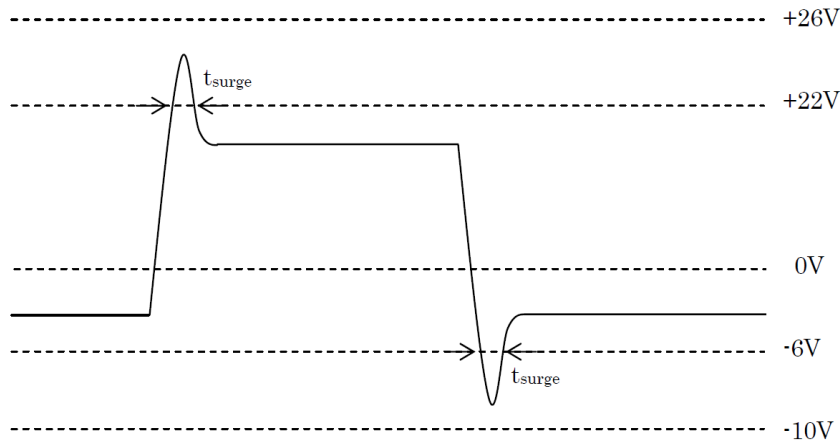
**●Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = 1\text{mA}$	1700	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 1700\text{V}, V_{GS} = 0\text{V}$	-	0.1	10	$\mu\text{A}$
		$T_{vj} = 150^{\circ}\text{C}$	-	0.2	-	
Gate - Source leakage current	$I_{GSS+}$	$V_{GS} = +22\text{V}, V_{DS} = 0\text{V}$	-	-	100	nA
Gate - Source leakage current	$I_{GSS-}$	$V_{GS} = -6\text{V}, V_{DS} = 0\text{V}$	-	-	-100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 0.41\text{mA}$	1.6	2.8	4.0	V

\*1 Limited by maximum  $T_{vj}$  and for Max.  $R_{thJC}$ .

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

\*3 Example of acceptable  $V_{GS}$  waveform



\*4 Pulsed

**●Electrical characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

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

**●Gate Charge characteristics** ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)

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

**●Body diode electrical characteristics (Source-Drain) ( $T_{vj} = 25^{\circ}\text{C}$  unless otherwise specified)**

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

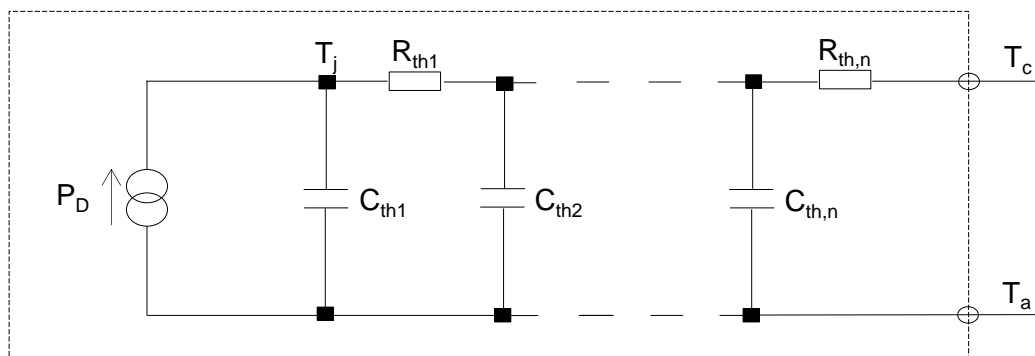
**●Thermal resistance**

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
$C_{th1}$	127 $\mu$	Ws/K
$C_{th2}$	1.64m	
$C_{th3}$	64.5m	



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

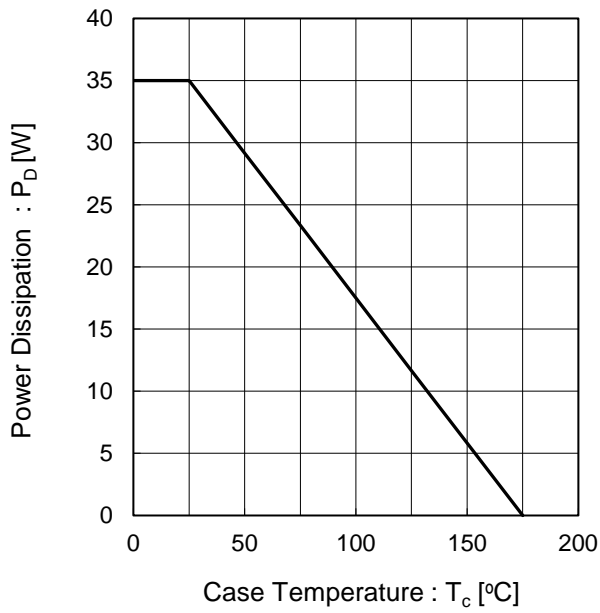


Fig.2 Maximum Safe Operating Area

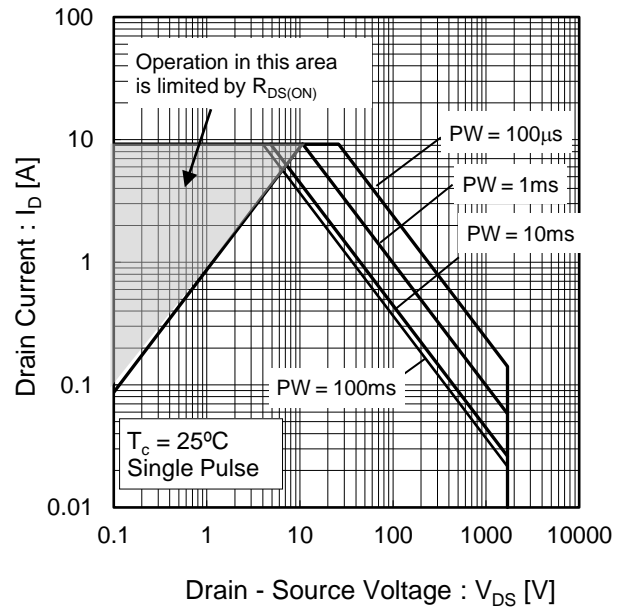
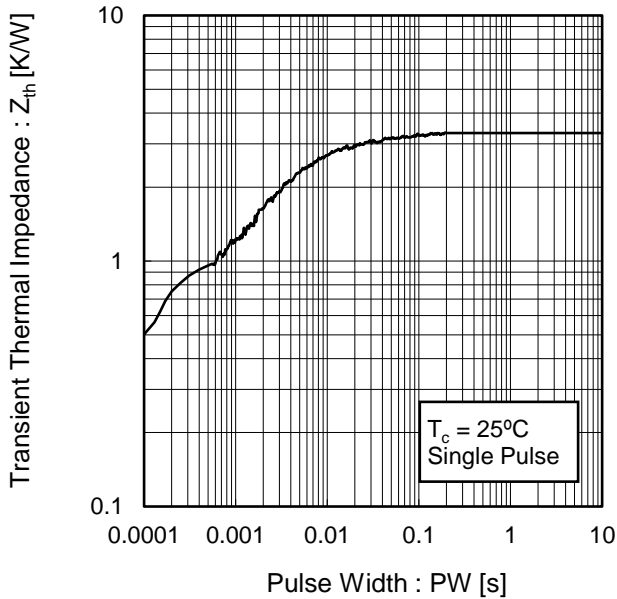


Fig.3 Typical Transient Thermal Impedance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

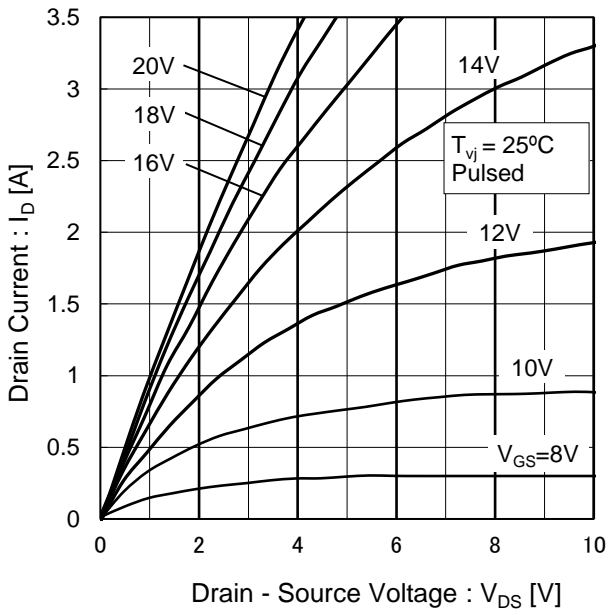


Fig.5 Typical Output Characteristics(II)

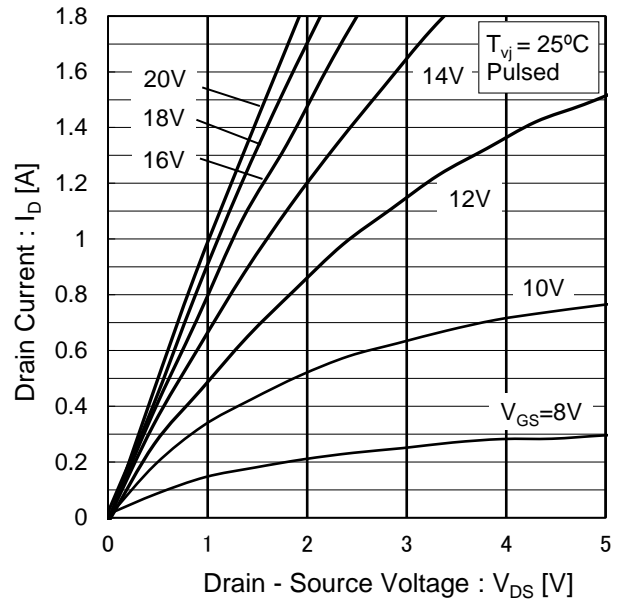


Fig.6  $T_{vj} = 150^\circ\text{C}$  Typical Output Characteristics(I)

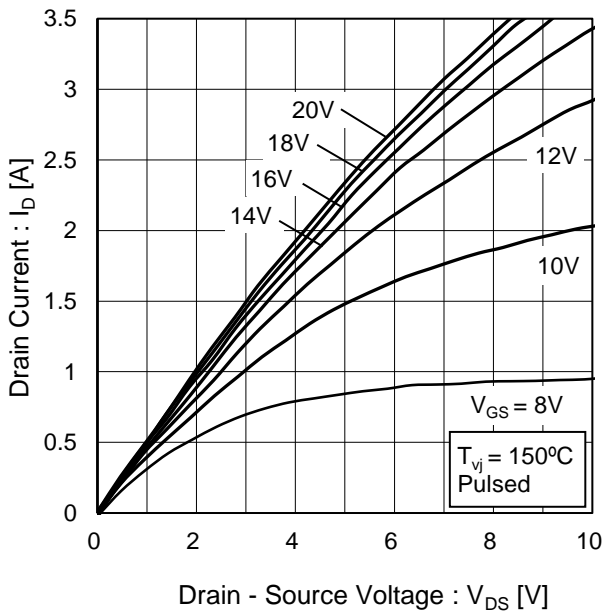
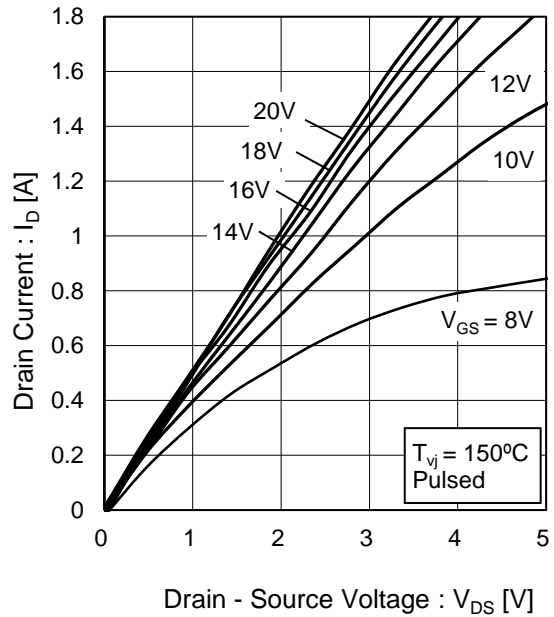


Fig.7  $T_{vj} = 150^\circ\text{C}$  Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics (I)

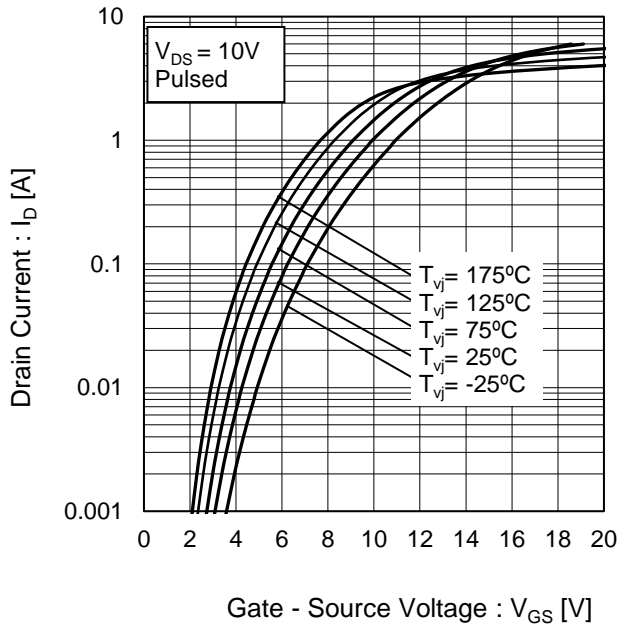


Fig.9 Typical Transfer Characteristics (II)

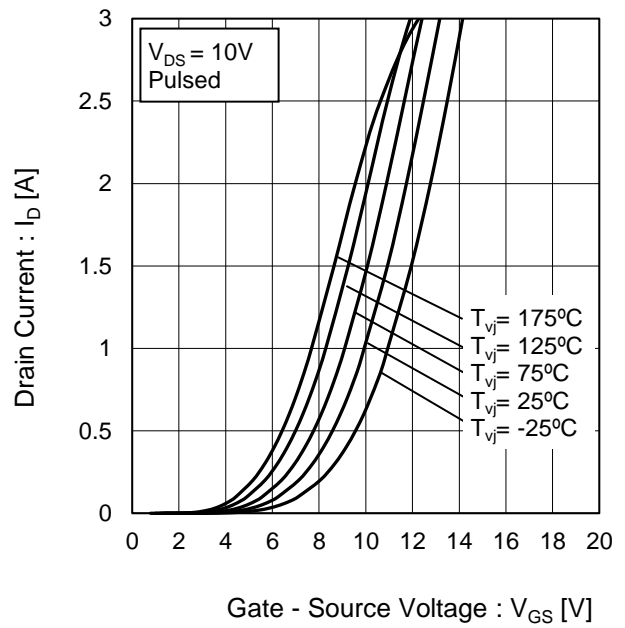


Fig.10 Gate Threshold Voltage vs. Virtual Junction Temperature

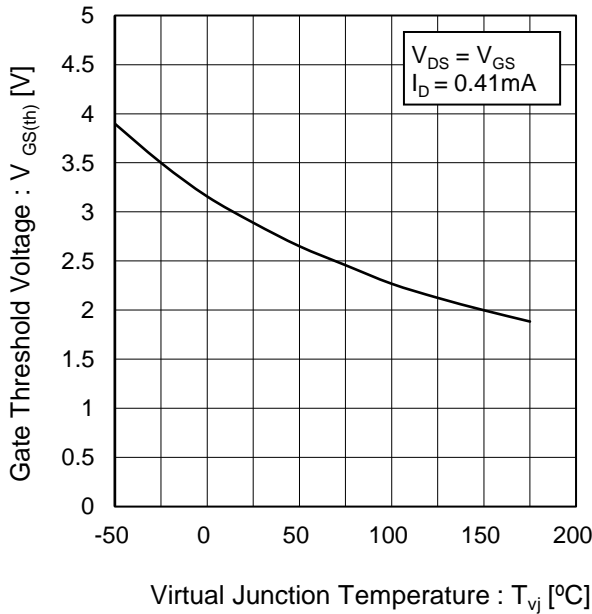
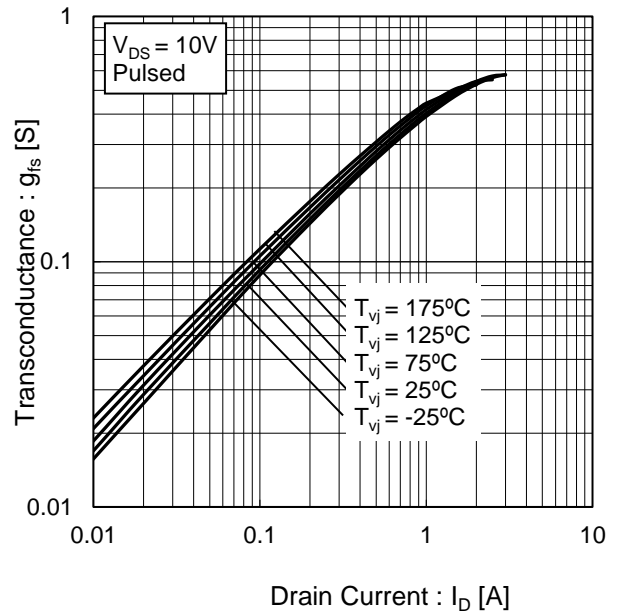


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

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

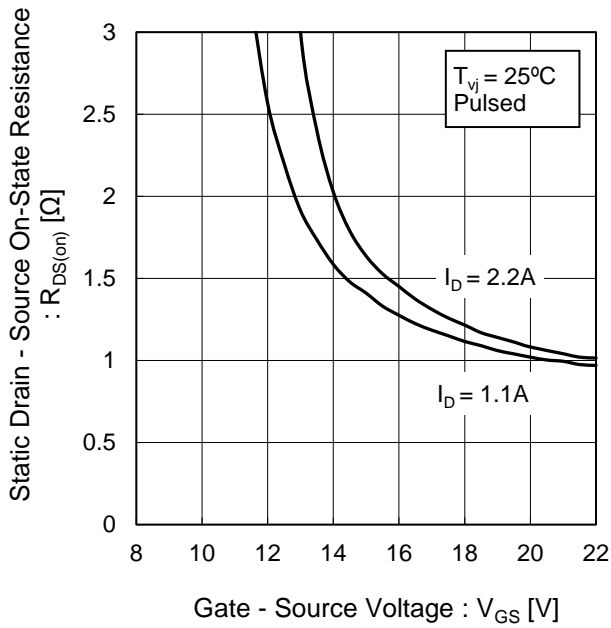


Fig.13 Static Drain - Source On - State Resistance vs. Virtual Junction Temperature

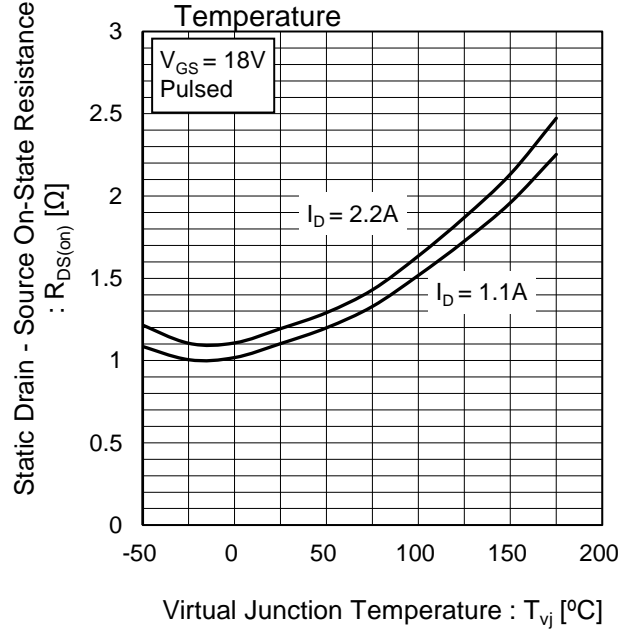
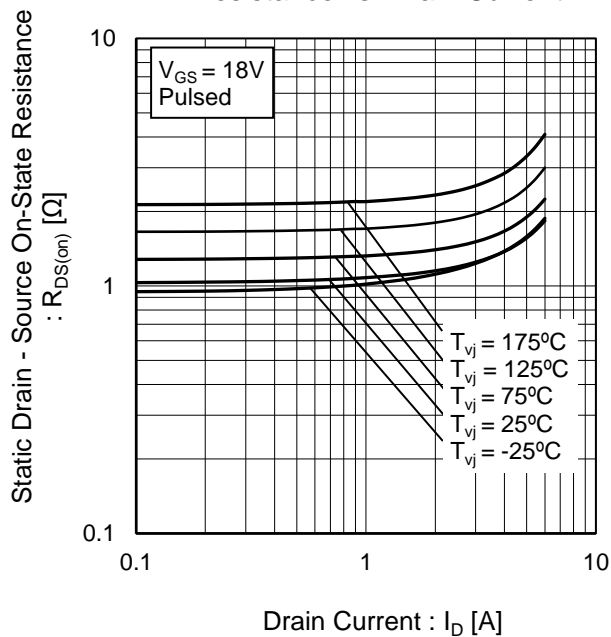


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

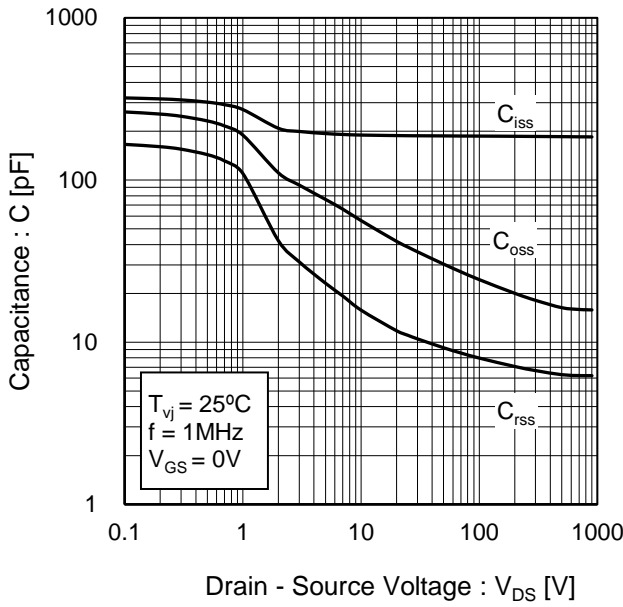


Fig.16 Coss Stored Energy

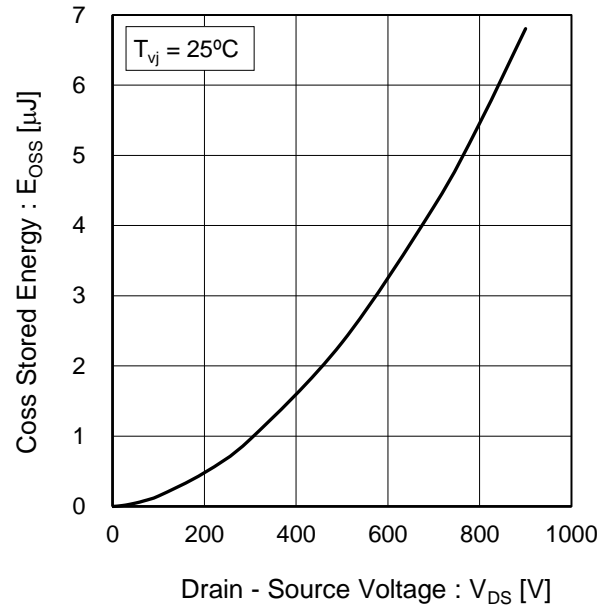


Fig.17 Switching Characteristics

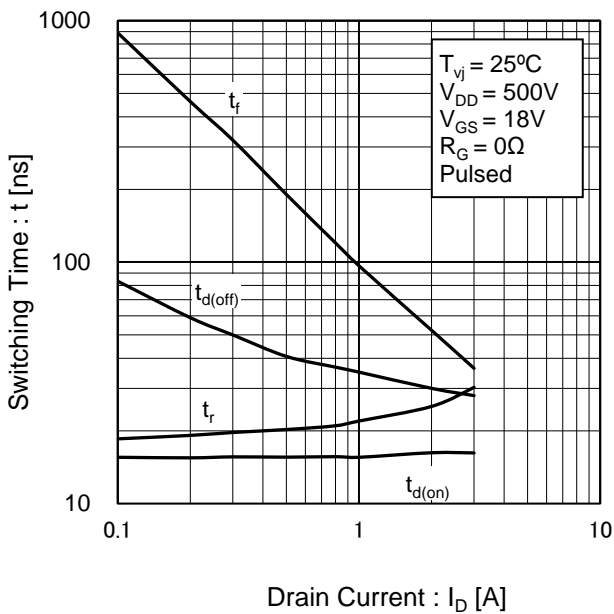
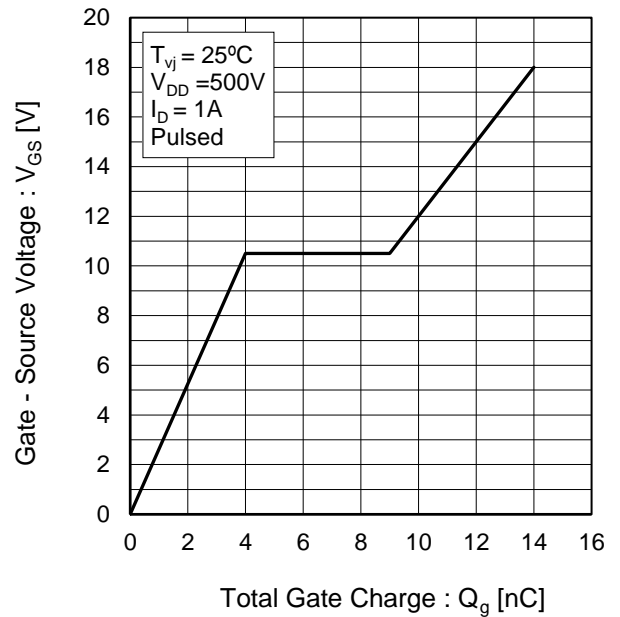


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

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

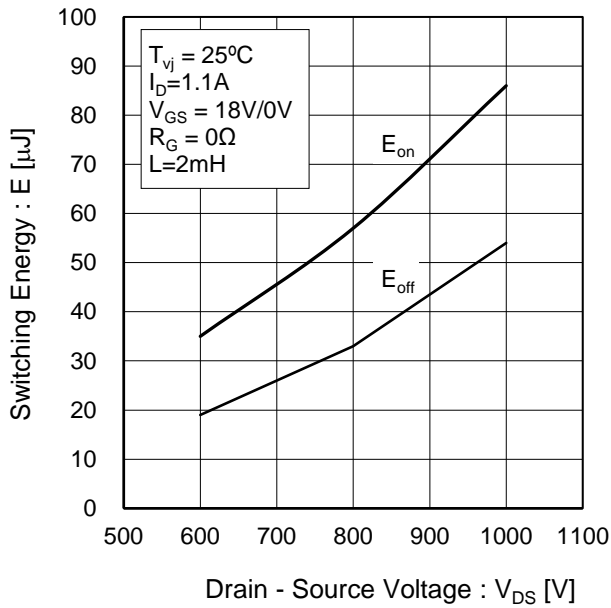


Fig.20 Typical Switching Loss vs. Drain Current

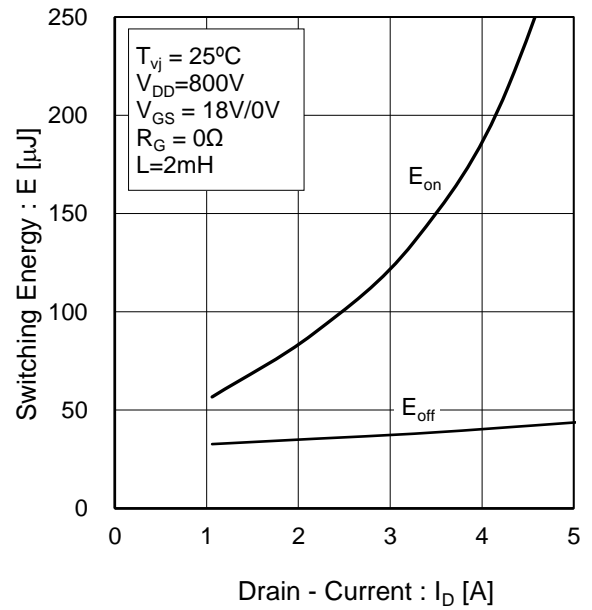
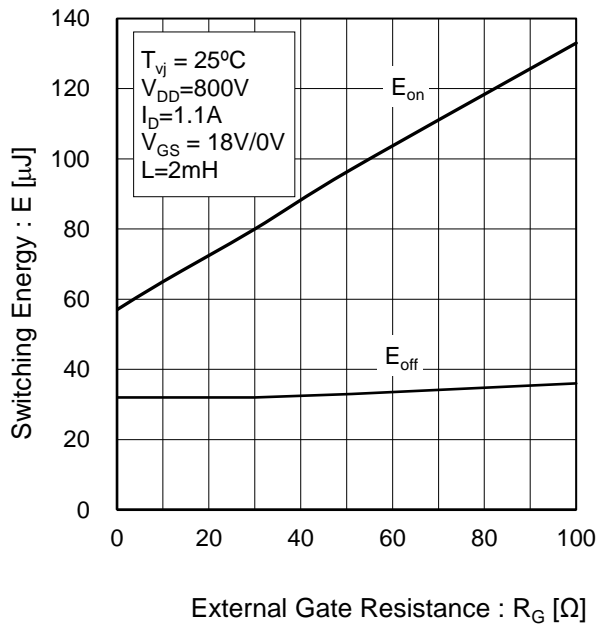


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

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

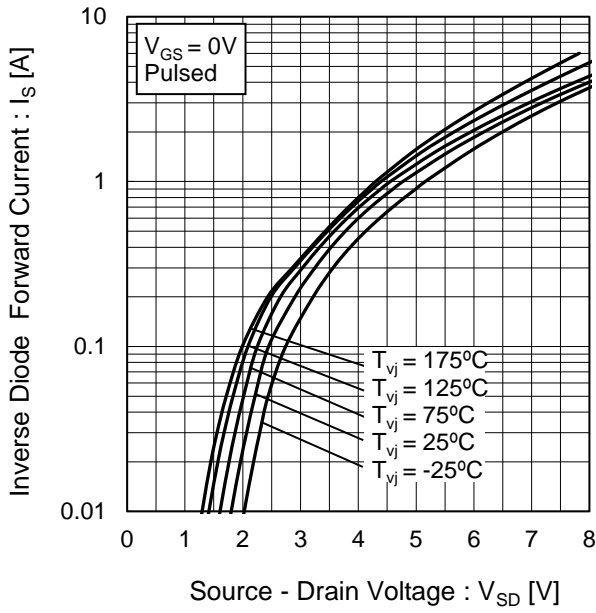
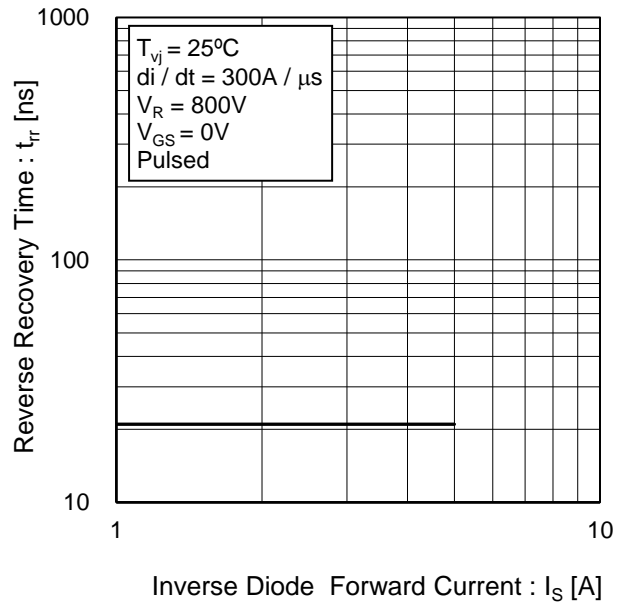


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

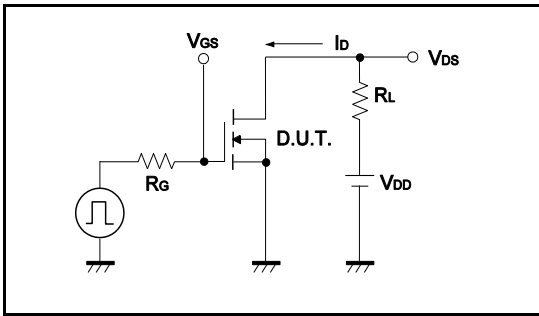


Fig.1-2 Switching Waveforms

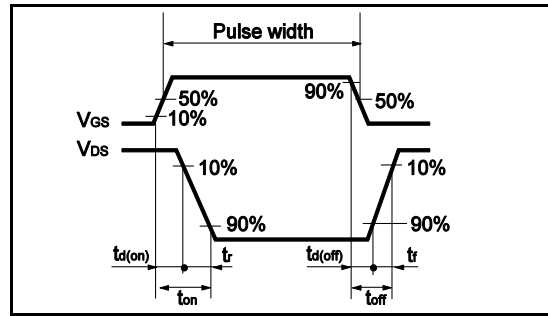


Fig.2-1 Gate Charge Measurement Circuit

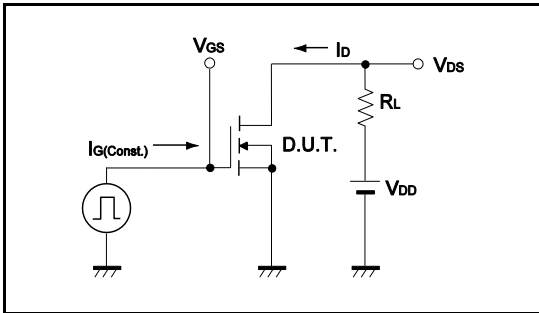


Fig.2-2 Gate Charge Waveform

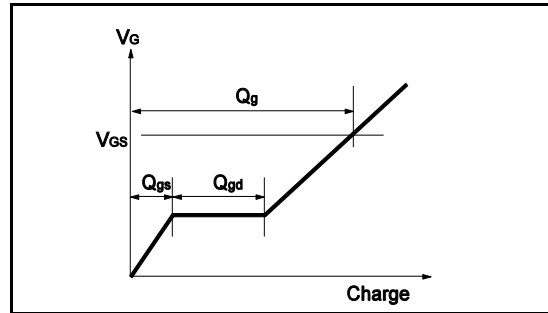


Fig.3-1 Switching Energy Measurement Circuit

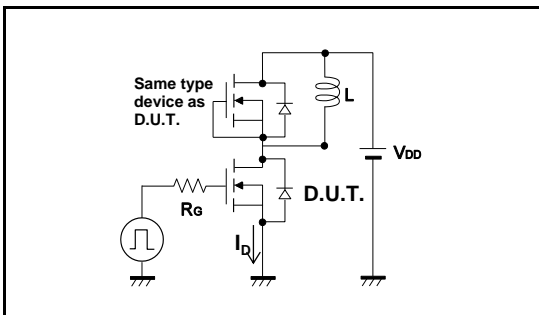


Fig.3-2 Switching Waveforms

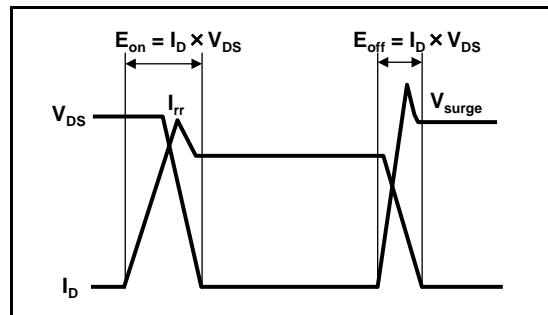


Fig.4-1 Reverse Recovery Time Measurement Circuit

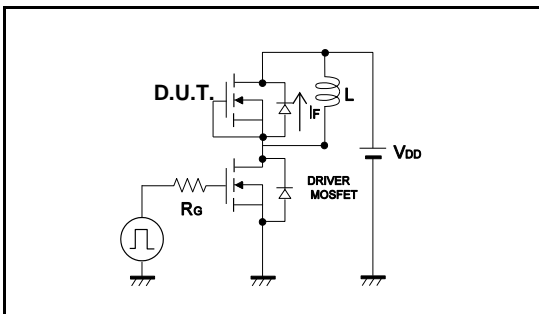
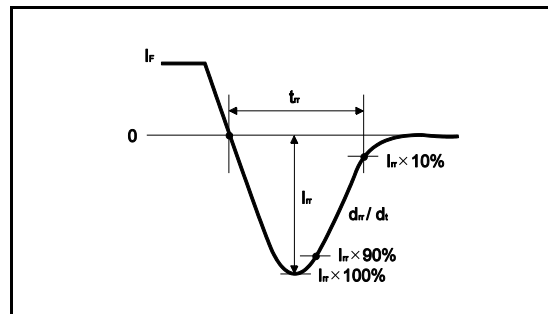
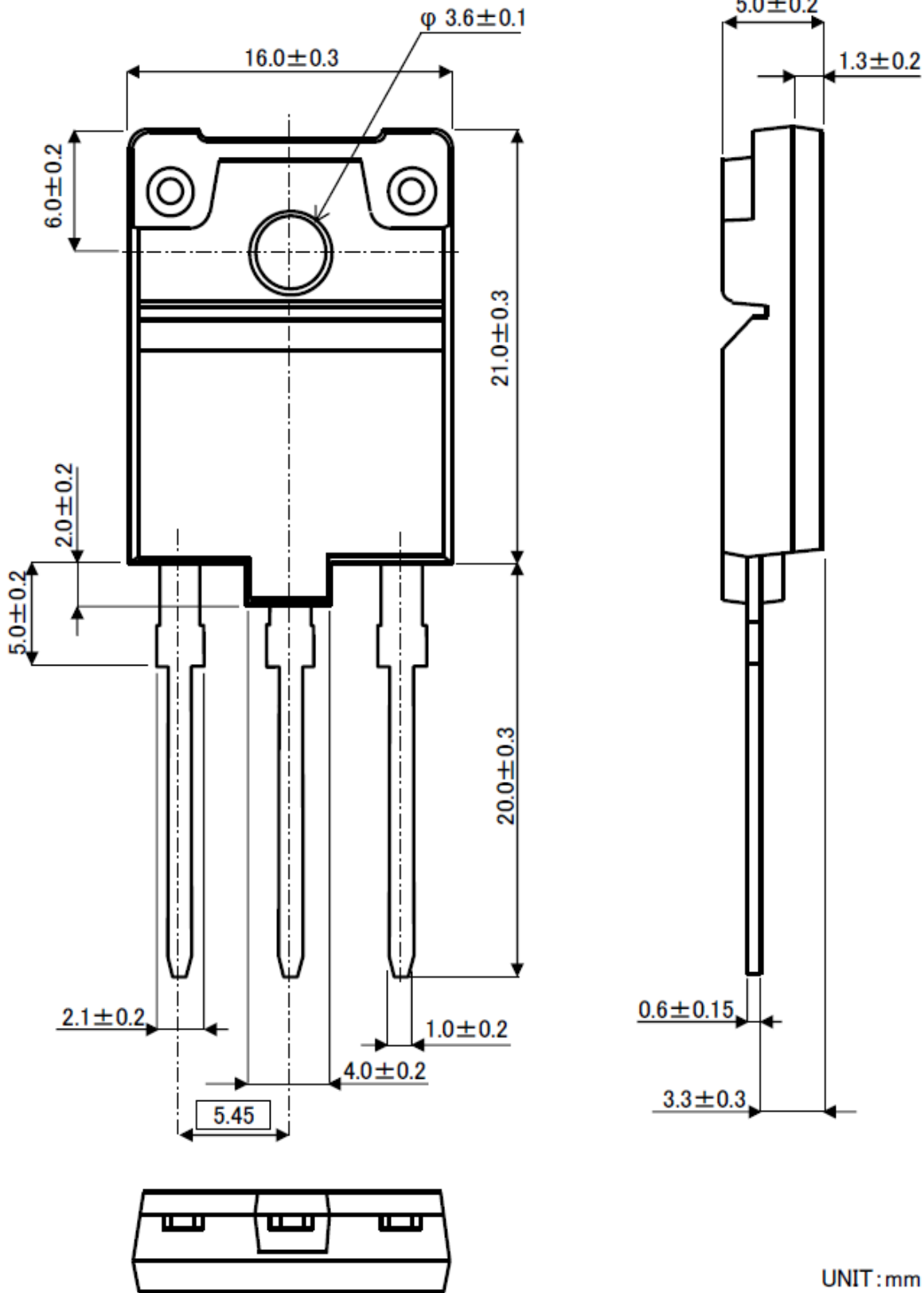


Fig.4-2 Reverse Recovery Waveform

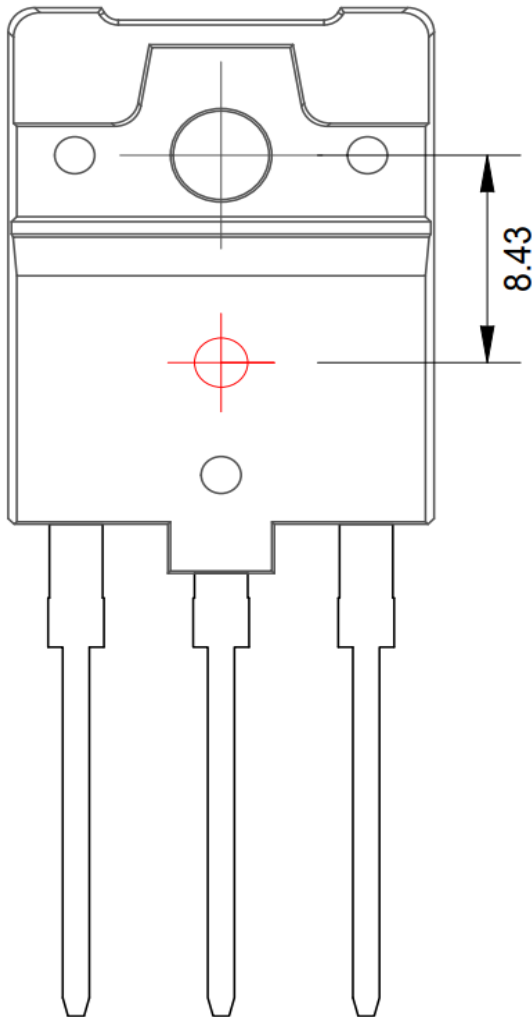
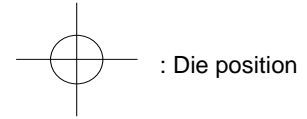


● Package Dimensions

TO-3PFM



## ●Die Bonding Layout



- 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

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