

TO-220



ITO-220



**Pin Definition:**

1. Gate
2. Drain
3. Source

**PRODUCT SUMMARY**

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)(max)	I <sub>D</sub> (A)
600	0.75 @ V <sub>GS</sub> =10V	10

**Features**

- Advanced high density cell design.
- High Power and Current handling capability.

**Application**

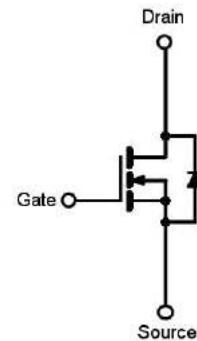
- Power Supply.
- Lighting.

**Ordering Information**

Part No.	Package	Packing
TSM10N60CZ C0G	TO-220	50pcs / Tube
TSM10N60CI C0G	ITO-220	50pcs / Tube

Note: "G" denote for Halogen Free Product

**Block Diagram**



N-Channel MOSFET

**Absolute Maximum Rating** (T<sub>C</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Limit		Unit
		TO-220	ITO-220	
Drain-Source Voltage	V <sub>DS</sub>	600		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Continuous Drain Current	I <sub>D</sub> <sup>a</sup>	10		A
		6		
Pulsed Drain Current <sup>b</sup>	I <sub>DM</sub> <sup>a</sup>	40		A
Total Power Dissipation @ T <sub>C</sub> =25°C	P <sub>DO</sub>	166	50	W
Single Pulsed Avalanche Energy <sup>c</sup>	E <sub>AS</sub>	41		mJ
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>SG</sub>	-55 to +150		°C

**Thermal Performance**

Parameter	Symbol	Limit		Unit
Junction to Case Thermal Resistance	R <sub>θJC</sub>	0.75	2.5	°C/W
Junction to Ambient Thermal Resistance	R <sub>θJA</sub>	63		°C/W

**Notes a:** Current limited by package

**Notes b:** Pulse width limited by the Maximum junction temperature

**Notes c:** L=0.75mH, I<sub>AS</sub>=10A, V<sub>DD</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C

**Specifications** (Ta = 25°C unless otherwise noted)

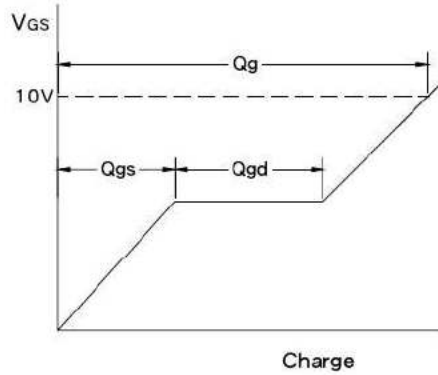
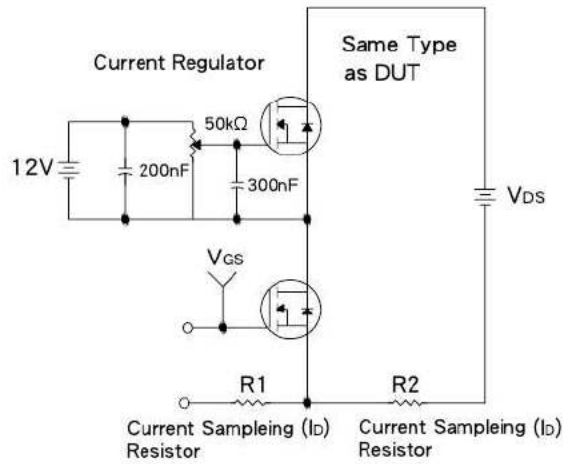
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static<sup>a</sup></b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	600	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(th)}$	2	3.1	4	V
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 600V, V_{GS} = 0V$	$I_{DSS}$	--	--	20	$\mu A$
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 5A$	$R_{DS(on)}$	--	0.61	0.75	$\Omega$
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$V_{DS} = 300V, I_D = 10A,$ $V_{GS} = 10V$	$Q_g$	--	45.8	--	nC
Gate-Source Charge		$Q_{gs}$	--	11.5	--	
Gate-Drain Charge		$Q_{gd}$	--	16	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	1738	--	pF
Output Capacitance		$C_{oss}$	--	195	--	
Reverse Transfer Capacitance		$C_{rss}$	--	26.3	--	
<b>Switching<sup>b</sup></b>						
Turn-On Delay Time	$V_{DD} = 300V, R_G = 10\Omega,$ $I_D = 10A, V_{GS} = 10V,$	$t_{d(on)}$	--	33.6	--	nS
Turn-On Rise Time		$t_r$	--	7.4	--	
Turn-Off Delay Time		$t_{d(off)}$	--	68	--	
Turn-Off Fall Time		$t_f$	--	15.2	--	
<b>Source-Drain Diode<sup>a</sup></b>						
Forward On Voltage	$I_S = 10A, V_{GS} = 0V$	VSD	--	0.8	1.5	V

**Notes a:** Pulse test:  $PW \leq 300\mu S$ , duty cycle  $\leq 2\%$

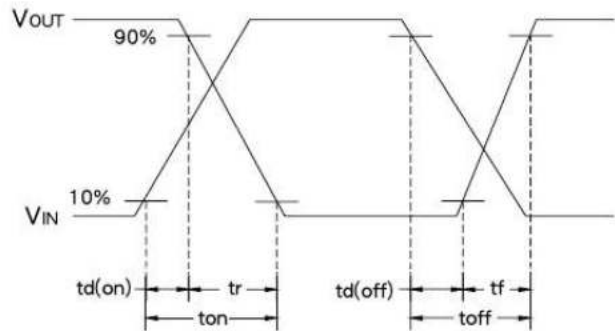
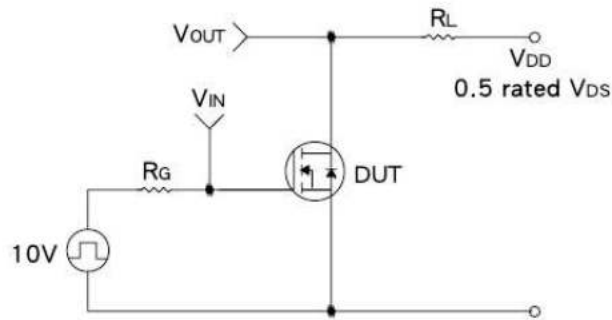
**Notes b:** For DESIGN AID ONLY, not subject to product on testing.

**Notes c:** Switching times are essentially independent of operating temperature.

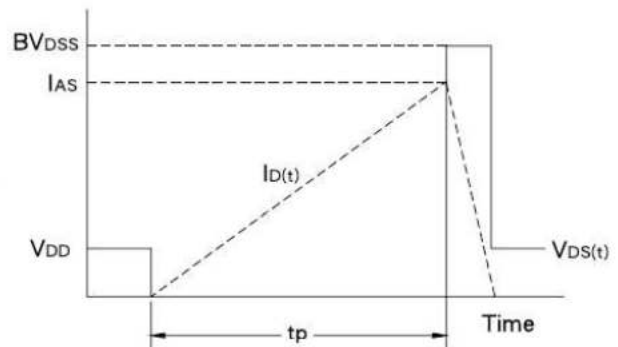
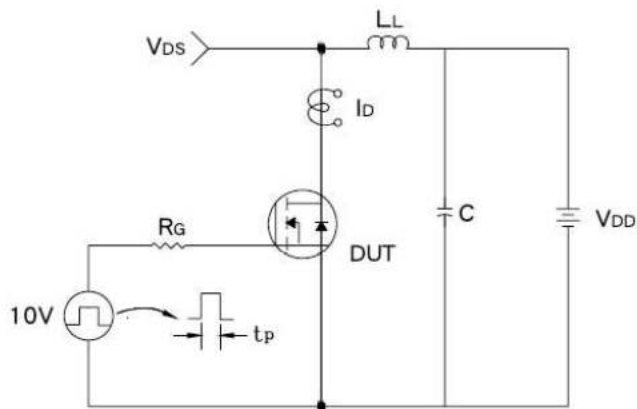
**Gate Charge Test Circuit & Waveform**



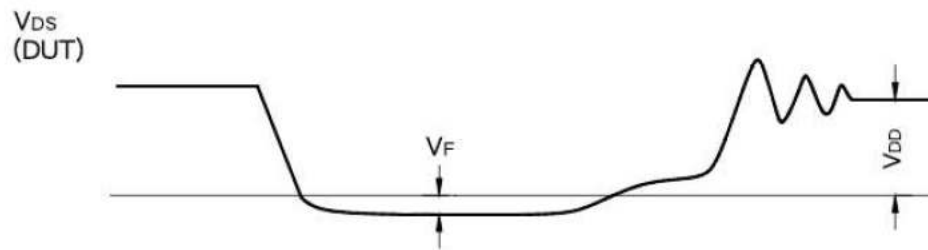
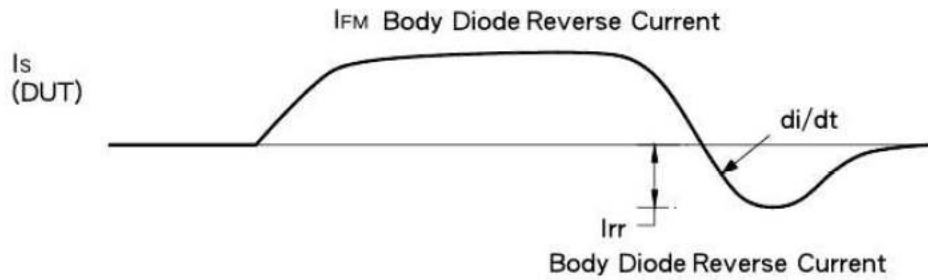
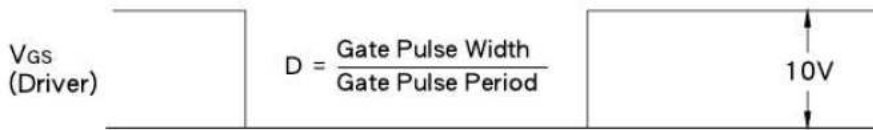
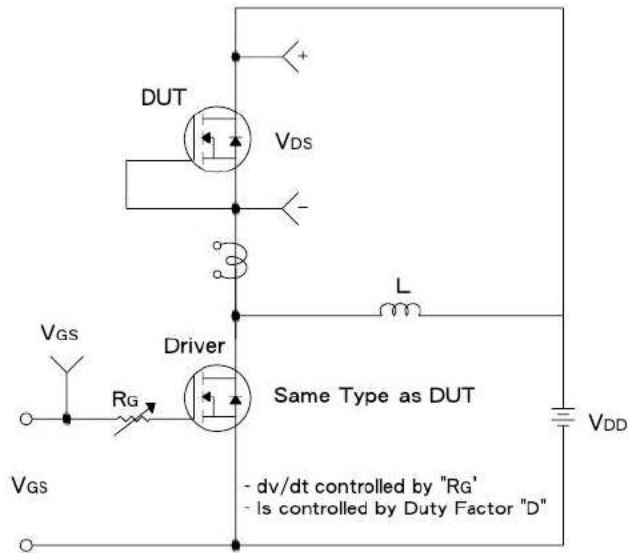
**Resistive Switching Test Circuit & Waveform**



**EAS Test Circuit & Waveform**

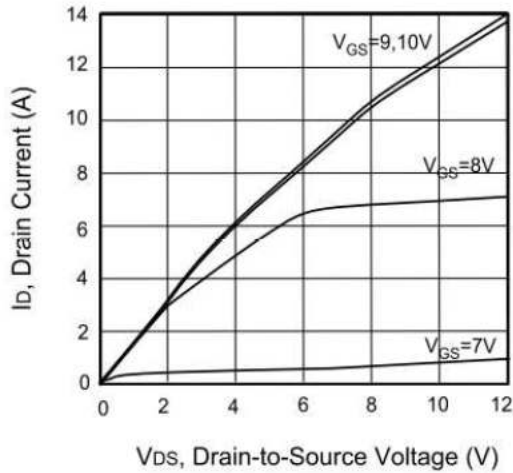


**Diode Reverse Recovery Time Test Circuit & Waveform**

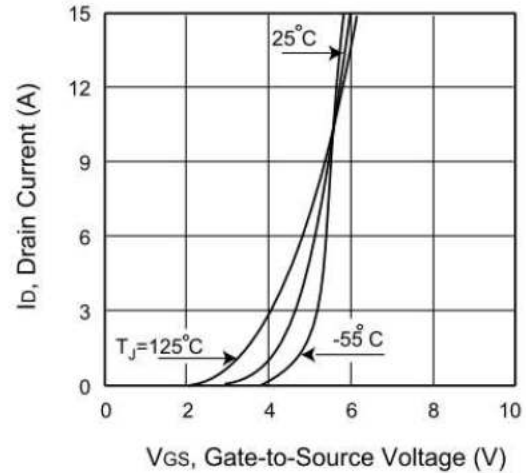


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

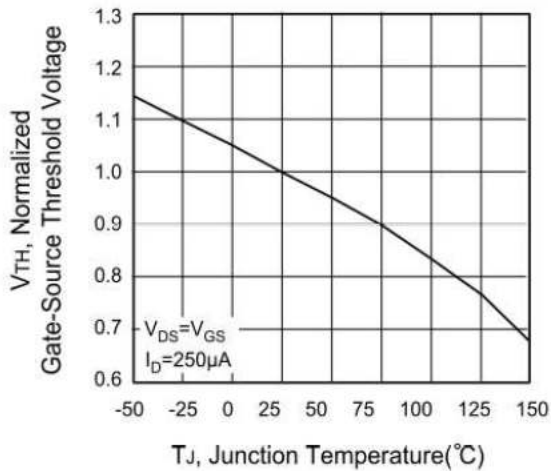
**Output Characteristics**



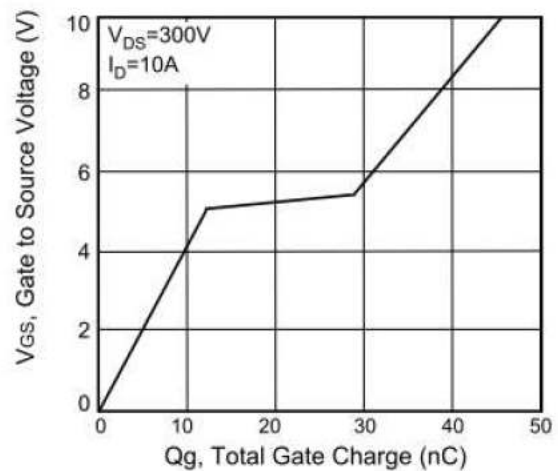
**Transfer Characteristics**



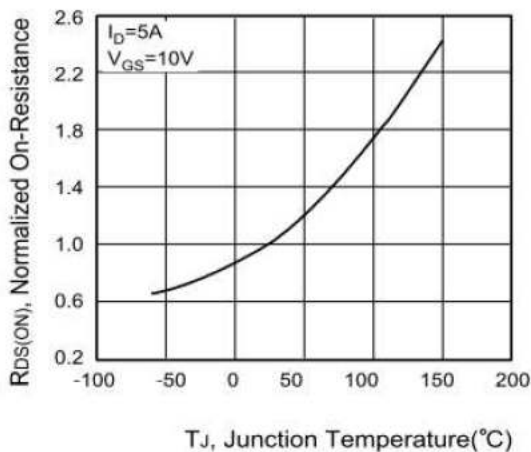
**Threshold Voltage**



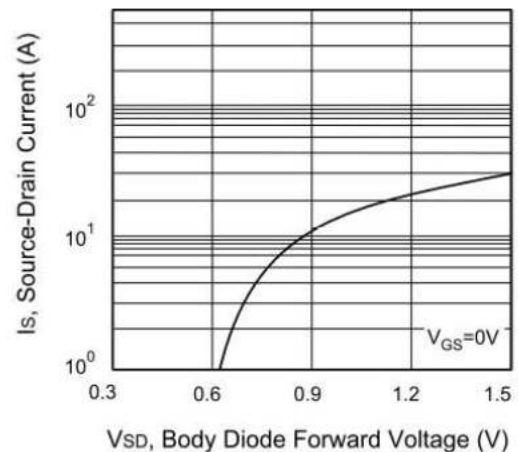
**Gate Charge**



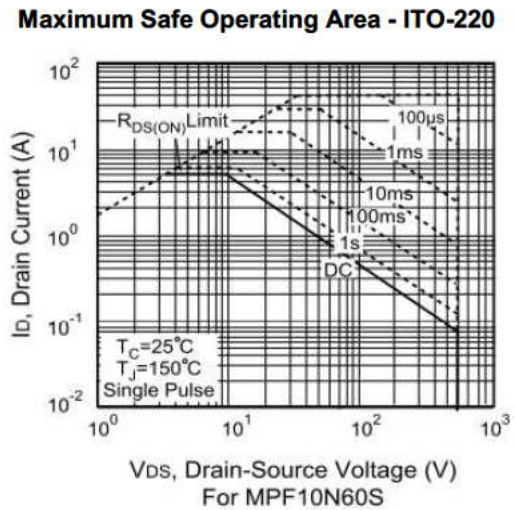
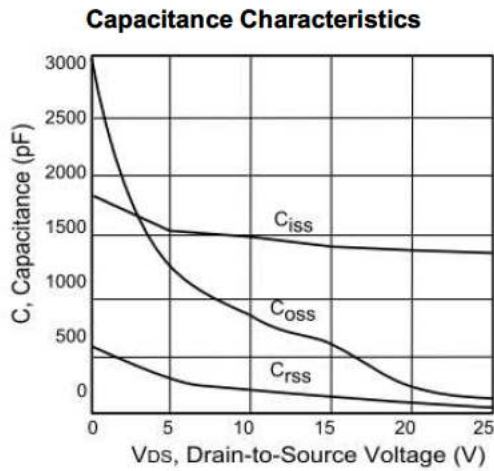
**On-Resistance vs. Junction Temperature**



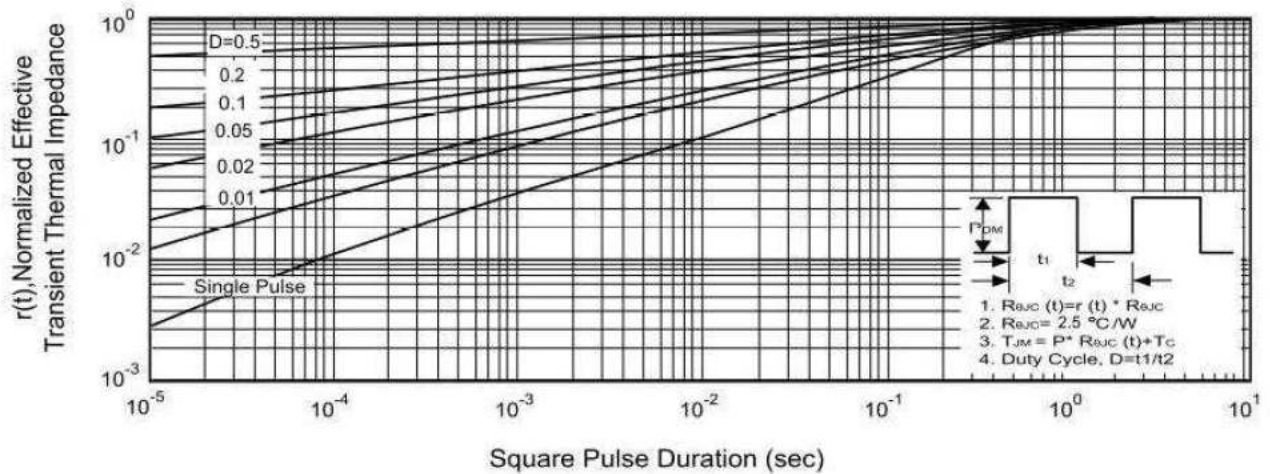
**Source-Drain Diode Forward Voltage**



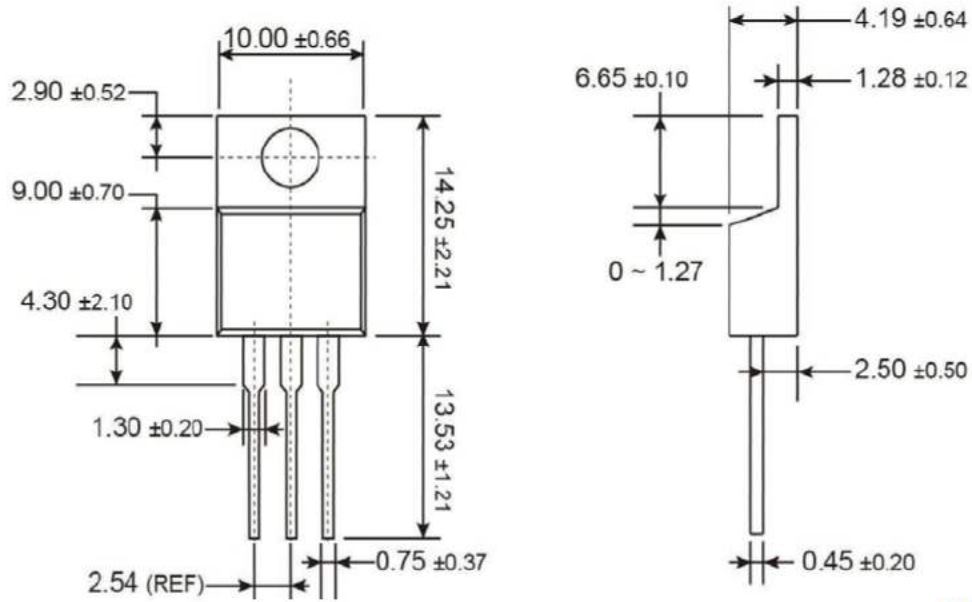
**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)



**Normalized Thermal Transient Impedance, Junction-to-Ambient**

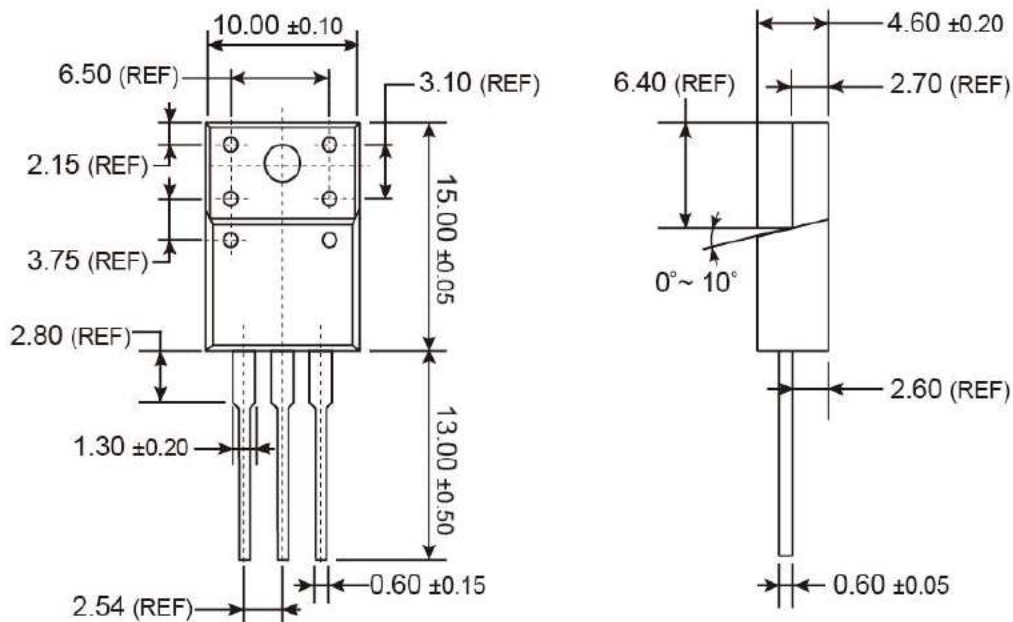


**TO-220 Mechanical Drawing**



Unit: M meters

**ITO-220 Mechanical Drawing**



Unit: M meters



## Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or seeing these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.