

## N-Channel Power MOSFET

900V, 7A, 1.9Ω

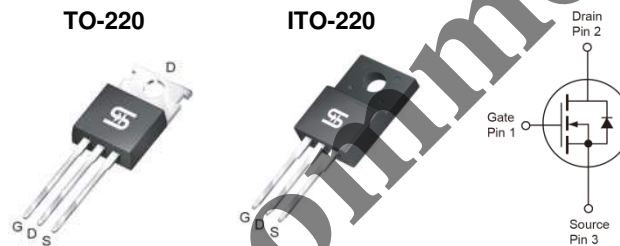
### FEATURES

- Low RDS(on) 1.9Ω (Max.)
- Low gate charge typical @49nC (Typ.)
- Improve dV/dt capability
- Pb-free plating
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
V <sub>DS</sub>	900	V
R <sub>DS(on)</sub> (max)	1.9	Ω
Q <sub>g</sub>	49	nC

### APPLICATION

- Power Supply
- Lighting



ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C unless otherwise noted)				
PARAMETER	SYMBOL	TO-220	ITO-220	UNIT
Drain-Source Voltage	V <sub>DS</sub>	900		V
Gate-Source Voltage	V <sub>GS</sub>	±30		V
Continuous Drain Current (Note 1)	I <sub>D</sub>	T <sub>C</sub> = 25°C		7
		T <sub>C</sub> = 100°C		4.31
Pulsed Drain Current (Note 2)	I <sub>DM</sub>	28		A
Total Power Dissipation @ T <sub>C</sub> = 25°C	P <sub>DTOT</sub>	250	40.3	W
Single Pulsed Avalanche Energy (Note 3)	E <sub>AS</sub>	106		mJ
Single Pulsed Avalanche Current (Note 3)	I <sub>AS</sub>	7		A
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	- 55 to +150		°C

THERMAL PERFORMANCE				
PARAMETER	SYMBOL	TO-220	ITO-220	UNIT
Junction to Case Thermal Resistance	R <sub>θJC</sub>	0.5	3.1	°C/W
Junction to Ambient Thermal Resistance	R <sub>θJA</sub>	62.5		°C/W

**Notes:** R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins. R<sub>θJA</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design. R<sub>θJA</sub> shown below for single device operation on FR-4 PCB with minimum recommended footprint in still air.

ELECTRICAL SPECIFICATIONS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
<b>Static</b> (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	900	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2	--	4	V
Gate Body Leakage	$V_{GS} = \pm 30V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 900V, V_{GS} = 0V$	$I_{DSS}$	--	--	10	$\mu A$
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 3.5A$	$R_{DS(on)}$	--	1.52	1.9	$\Omega$
<b>Dynamic</b> (Note 5)						
Total Gate Charge	$V_{DS} = 720V, I_D = 7A,$ $V_{GS} = 10V$	$Q_g$	--	49	--	nC
Gate-Source Charge		$Q_{gs}$	--	7	--	
Gate-Drain Charge		$Q_{gd}$	--	20	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	1969	--	pF
Output Capacitance		$C_{oss}$	--	133	--	
Reverse Transfer Capacitance		$C_{rss}$	--	11	--	
<b>Switching</b> (Note 6)						
Turn-On Delay Time	$V_{DD} = 380V,$ $R_{GEN} = 25\Omega,$ $I_D = 10A, V_{GS} = 10V,$	$t_{d(on)}$	--	39	--	ns
Turn-On Rise Time		$t_r$	--	38	--	
Turn-Off Delay Time		$t_{d(off)}$	--	155	--	
Turn-Off Fall Time		$t_f$	--	45	--	
<b>Source-Drain Diode</b> (Note 4)						
Forward On Voltage	$I_S = 10A, V_{GS} = 0V$	$V_{SD}$	--	--	1.4	V
Reverse Recovery Time	$I_S = 7A,$ $di_f/dt = 100A/\mu s$	$t_{rr}$	--	464	--	ns
Reverse Recovery Charge		$Q_{rr}$	--	4.7	--	$\mu C$

**Notes:**

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3.  $L = 4.1mH, I_{AS} = 7A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$   
 100% Eas Test Condition:  $L = 1mH, I_{AS} = 3.5A, V_{DD} = 50V, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
4. Pulse test:  $PW \leq 300\mu s$ , duty cycle  $\leq 2\%$ .
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

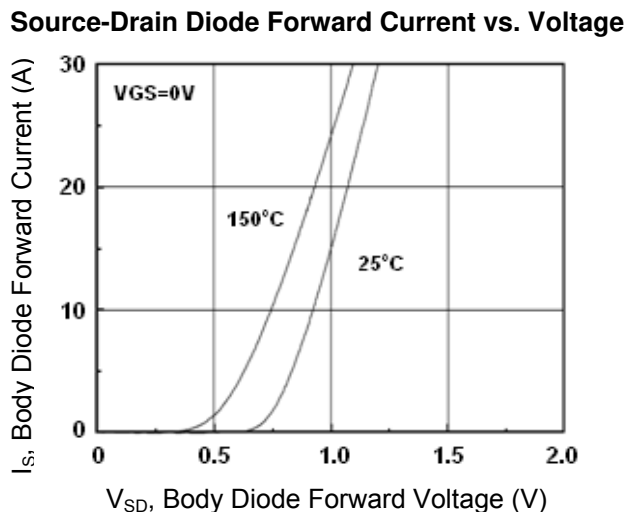
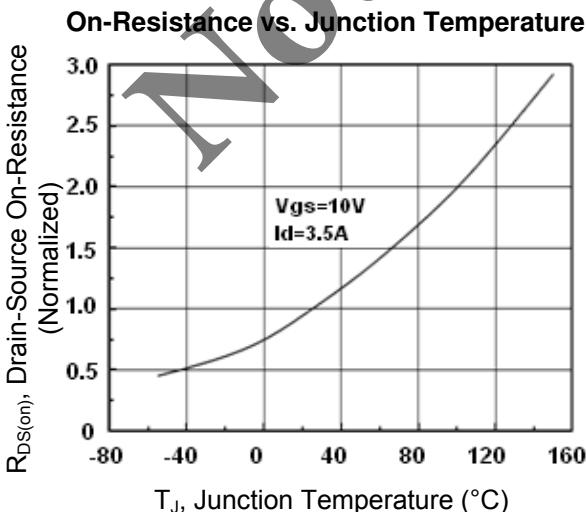
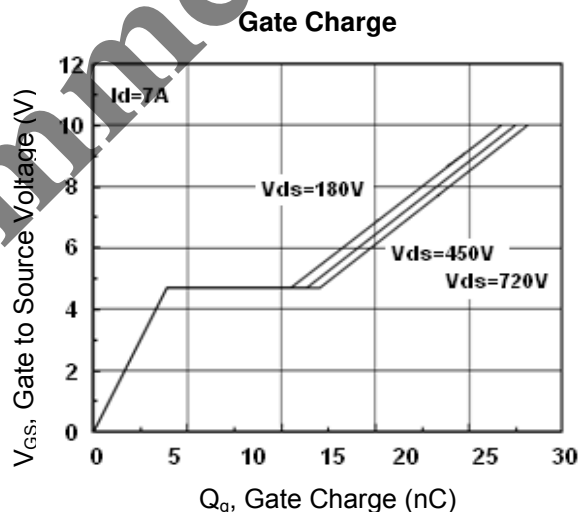
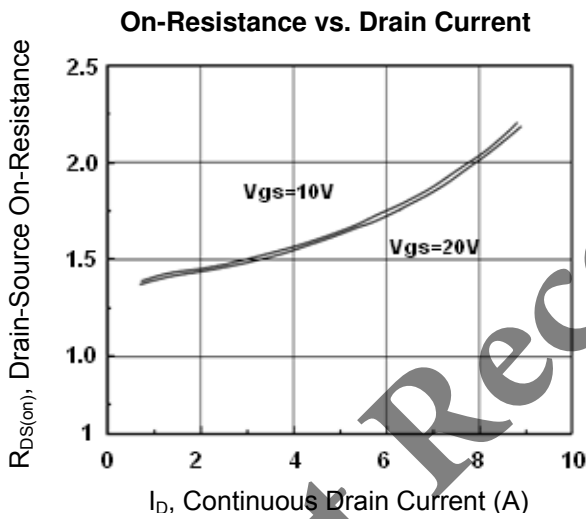
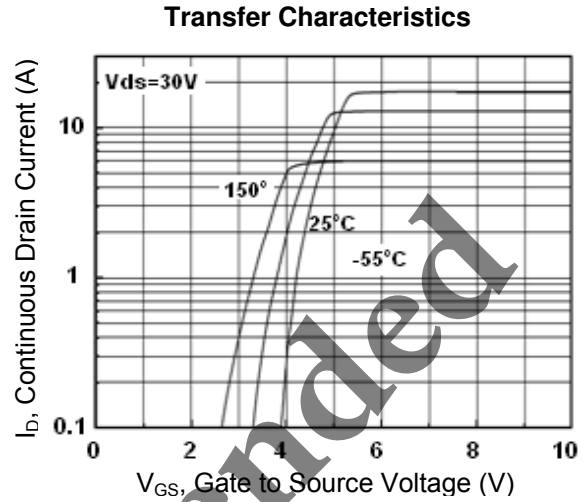
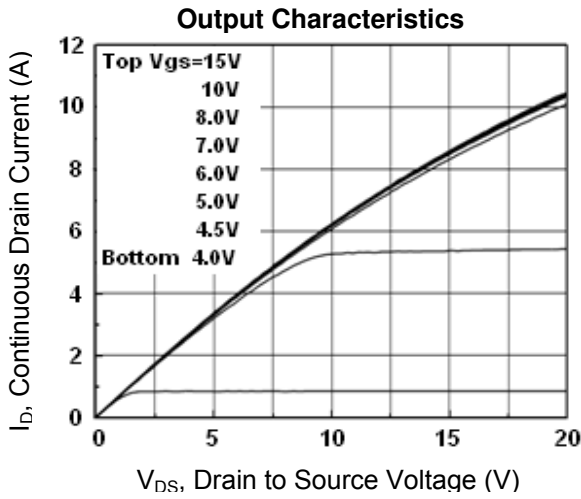
## ORDERING INFORMATION

PART NO.	PACKAGE	PACKING
TSM7N90CZ C0G	TO-220	50pcs/Tube
TSM7N90CI C0G	ITO-220	50pcs/Tube

**Not Recommended**

**CHARACTERISTICS CURVES**

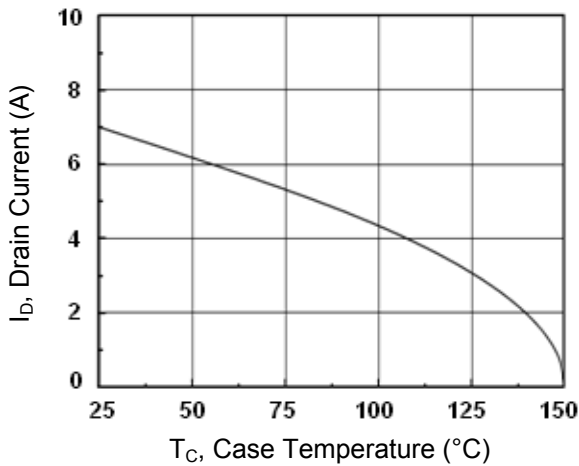
( $T_C = 25^\circ\text{C}$  unless otherwise noted)



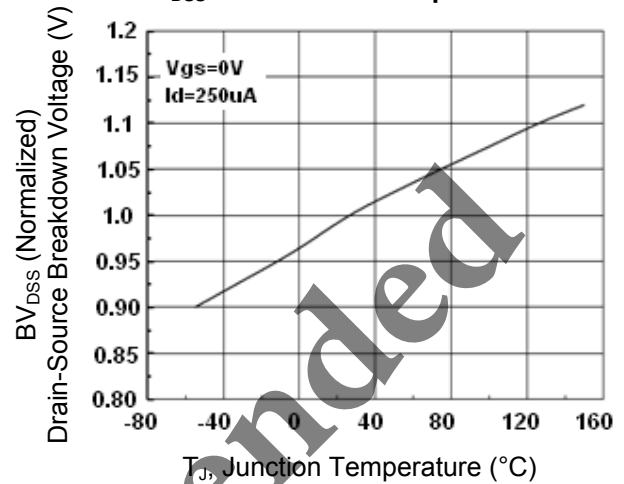
**CHARACTERISTICS CURVES**

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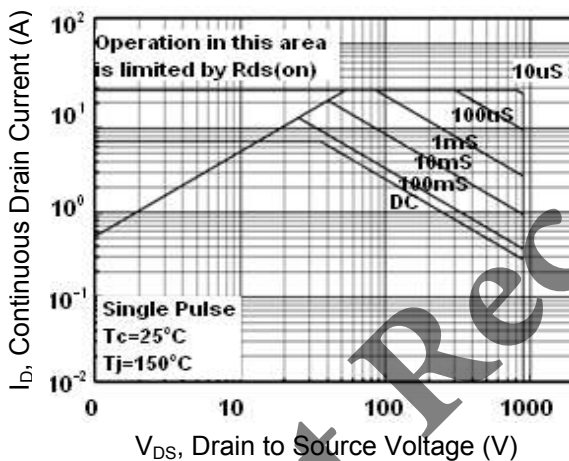
**Drain Current vs. Case Temperature**



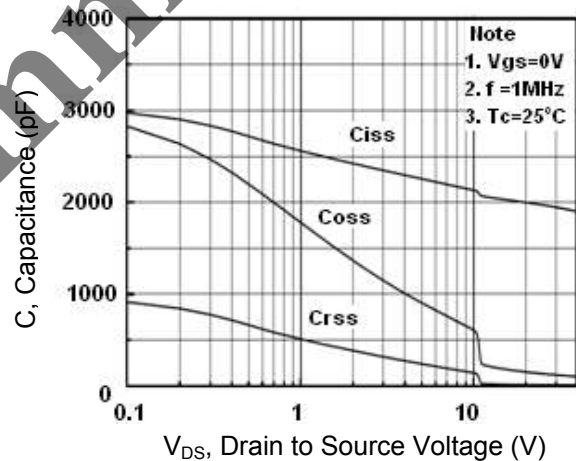
**$BV_{DSS}$  vs. Junction Temperature**



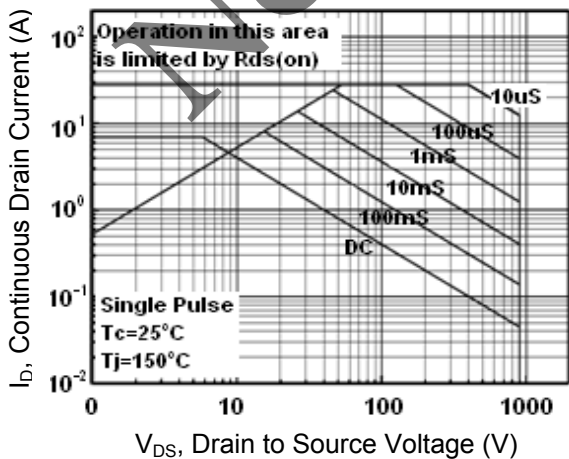
**Maximum Safe Operating Area (TO-220)**



**Capacitance vs. Drain-Source Voltage**



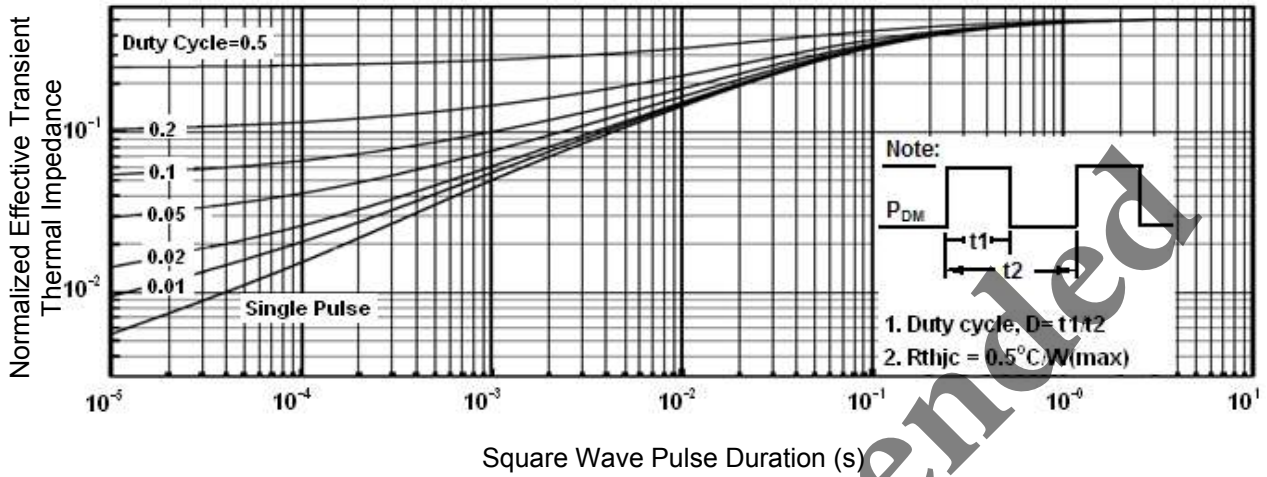
**Maximum Safe Operating Area (ITO-220)**



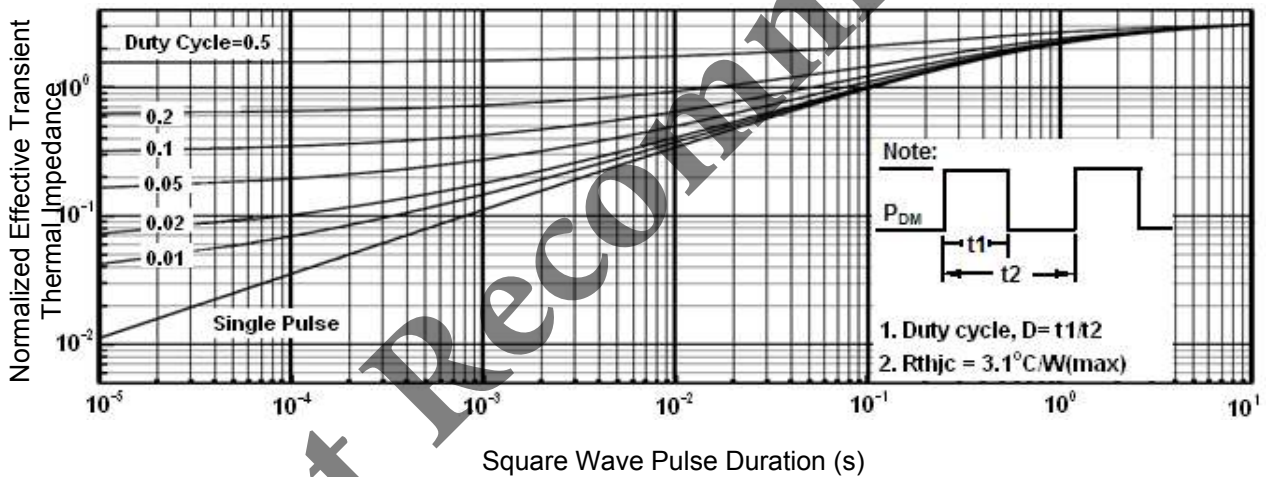
**CHARACTERISTICS CURVES**

( $T_c = 25^\circ\text{C}$  unless otherwise noted)

**Normalized Thermal Transient Impedance, Junction-to-Case (TO-220)**

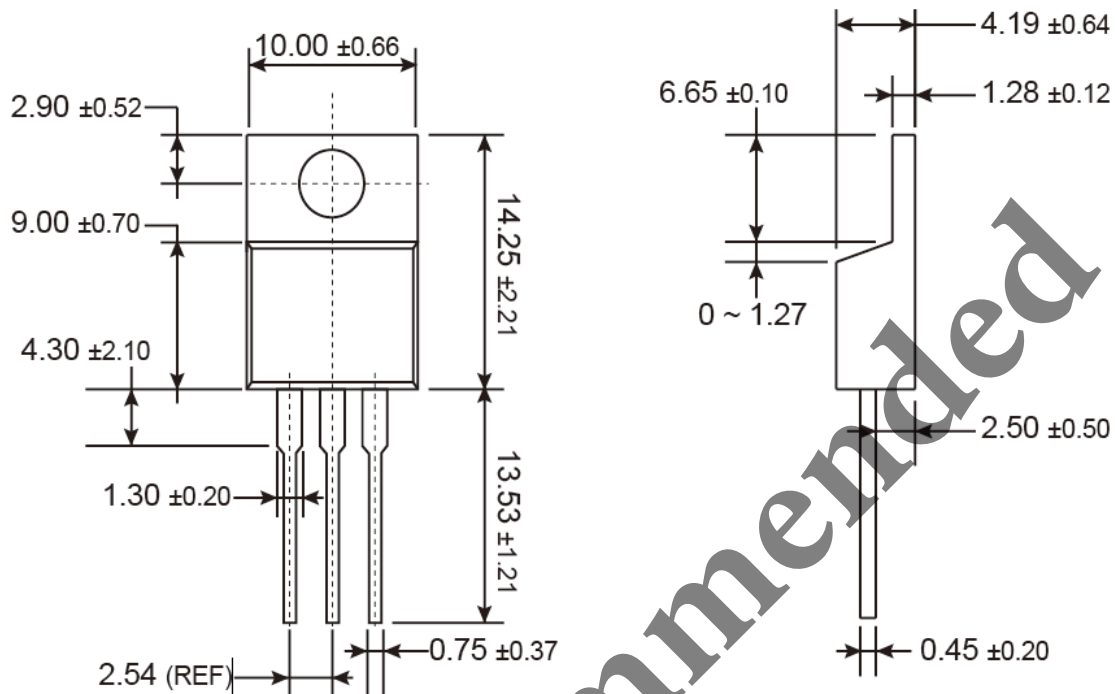


**Normalized Thermal Transient Impedance, Junction-to-Case (ITO-220)**



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

**TO-220**

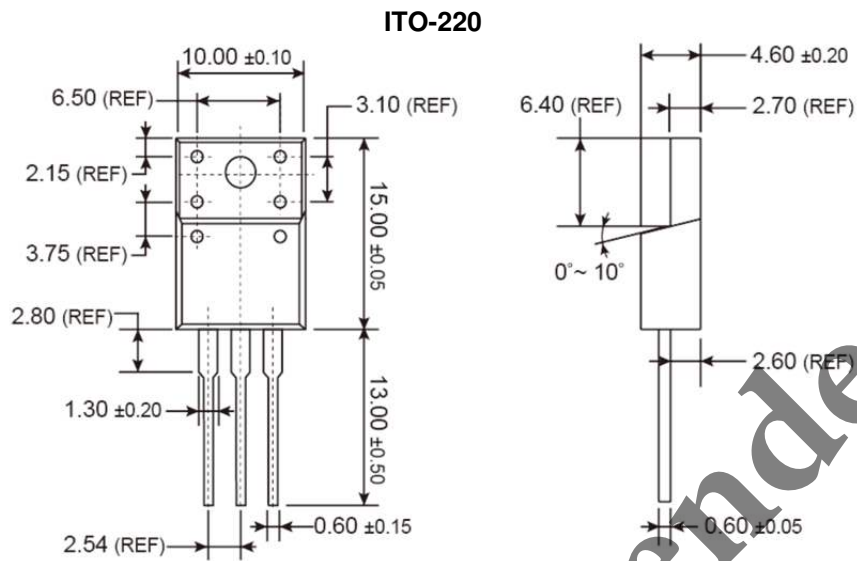


MARKING DIAGRAM



- Y** = Year Code
- M** = Month Code for Halogen Free Product
- O** =Jan    **P** =Feb    **Q** =Mar    **R** =Apr
- S** =May    **T** =Jun    **U** =Jul    **V** =Aug
- W** =Sep    **X** =Oct    **Y** =Nov    **Z** =Dec
- L** = Lot Code (1~9, A~Z)

PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)



MARKING DIAGRAM



- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

Not Recommended



**Not Recommended**

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