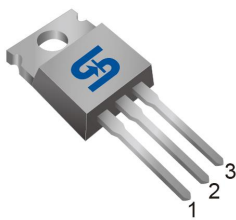
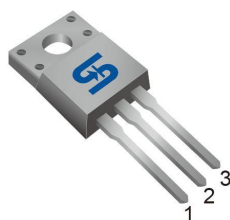




TO-220



ITO-220



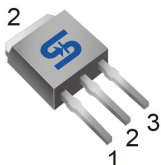
Pin Definition:

1. Gate
2. Drain
3. Source

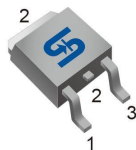
Key Parameter Performance

Parameter	Value	Unit
V_{DS}	-60	V
$R_{DS(on)}$ (max)	$V_{GS} = -10V$	48
	$V_{GS} = -4.5V$	65
Q_g	22.4	nC

TO-251S (IPAK)



TO-252 (DPAK)

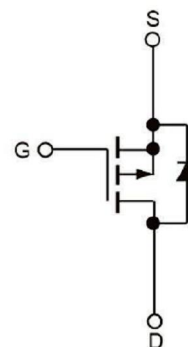


Ordering Information

Part No.	Package	Packing
TSM480P06CZ C0G	TO-220	50pcs / Tube
TSM480P06CI C0G	ITO-220	50pcs / Tube
TSM480P06CH X0G	TO-251S	75pcs / Tube
TSM480P06CP ROG	TO-252	2.5kpcs / 13+Reel

Note: %G+denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

Block Diagram



P-Channel MOSFET

Absolute Maximum Ratings ($T_c = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit			Unit
		IPAK/DPAK	ITO-220	TO-220	
Drain-Source Voltage	V_{DS}	-60			V
Gate-Source Voltage	V_{GS}	± 20			V
Continuous Drain Current ^(Note 1)	I_D	$T_c = 25^\circ C$			A
		$T_c = 100^\circ C$			A
Pulsed Drain Current ^(Note 2)	I_{DM}	-64			A
Single Pulse Avalanche Energy ^(Note 3)	E_{AS}	51			mJ
Single Pulse Avalanche Current ^(Note 2)	I_{AS}	-32			A
Power Dissipation @ $T_c = 25^\circ C$	P_D	40	27	66	W
Operating Junction Temperature	T_J	-50 to +150			$^\circ C$
Storage Temperature Range	T_{STG}	-50 to +150			$^\circ C$



Thermal Performance

Parameter	Symbol	Limit			Unit
		IPAK/DPAK	ITO-220	TO-220	
Thermal Resistance - Junction to Case	R_{JC}	3.1	4.7	1.9	°C/W
Thermal Resistance - Junction to Ambient	R_{JA}	62			°C/W

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

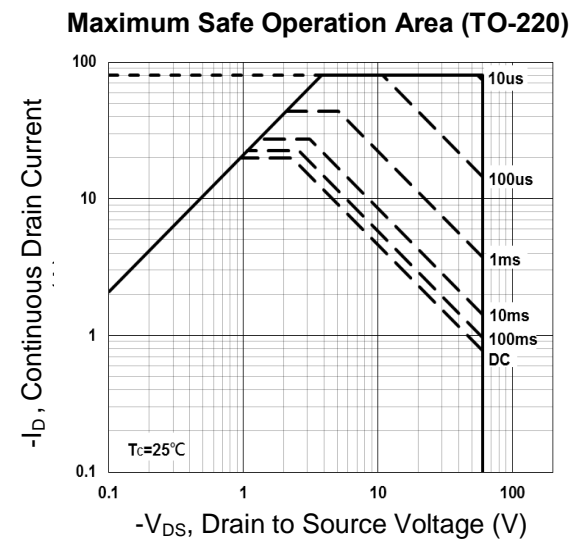
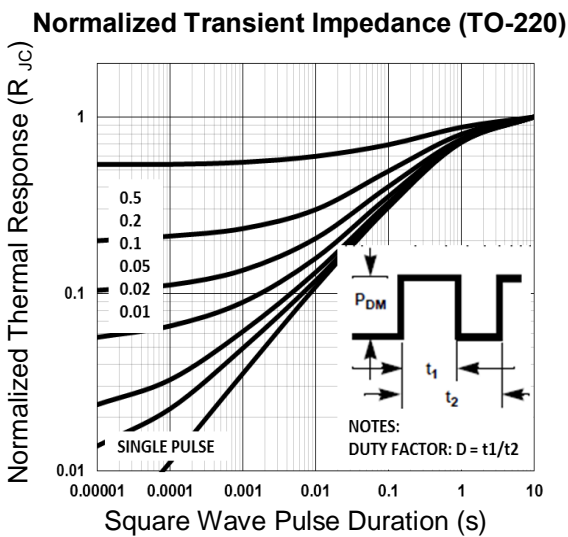
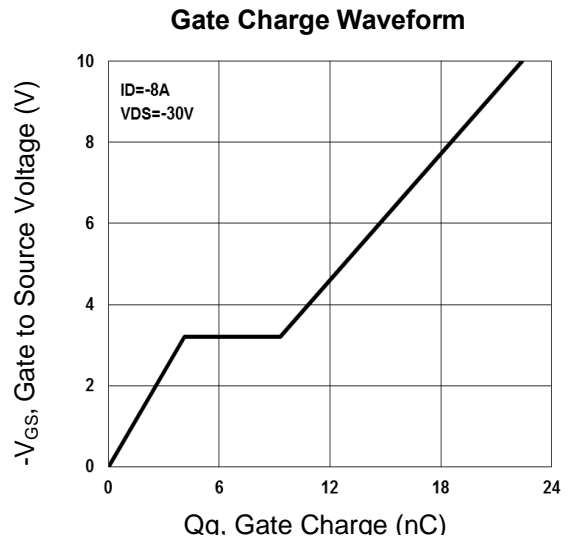
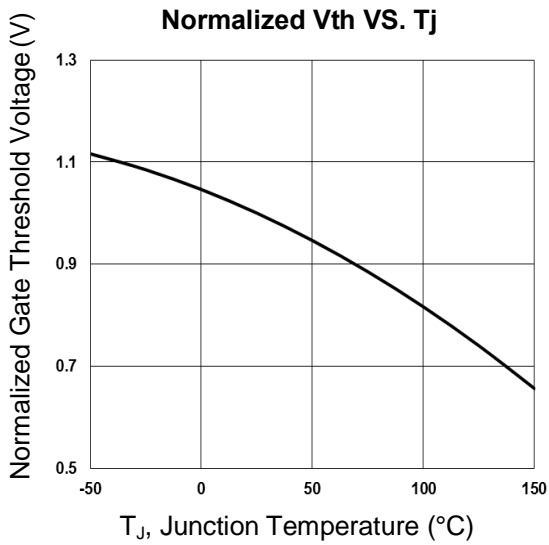
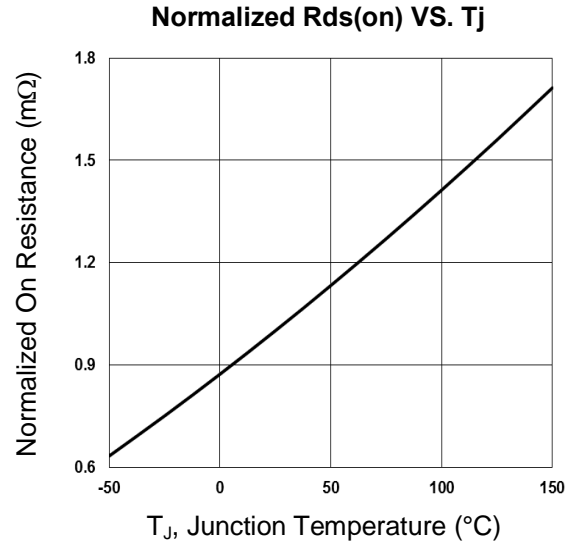
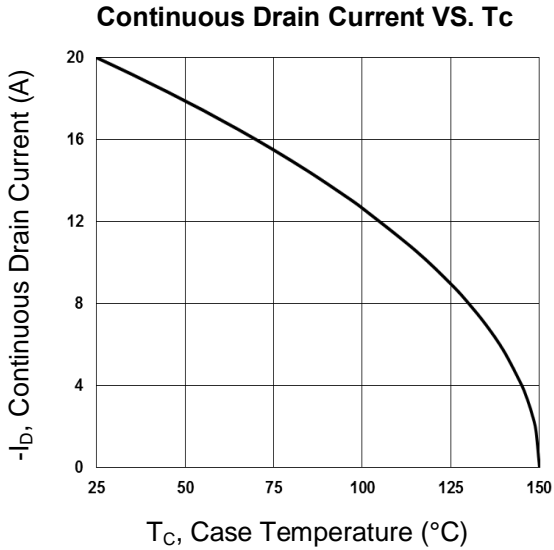
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	-60	--	--	V
Drain-Source On-State Resistance	$V_{GS} = -10V, I_D = -8A$	$R_{DS(ON)}$	--	39	48	m
	$V_{GS} = -4.5V, I_D = -4A$		--	53	65	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	$V_{GS(TH)}$	-1.2	-1.6	-2.2	V
Zero Gate Voltage Drain Current	$V_{DS} = -60V, V_{GS} = 0V$	I_{DSS}	--	--	-1	μA
	$V_{DS} = -48V, T_C = 125^\circ\text{C}$		--	--	-10	
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Forward Transconductance ^(Note 4)	$V_{DS} = -10V, I_D = -8A$	g_{fs}	--	10	--	S
Dynamic						
Total Gate Charge ^(Note 4,5)	$V_{DS} = -30V, I_D = -8A,$ $V_{GS} = -10V$	Q_g	--	22.4	--	nC
Gate-Source Charge ^(Note 4,5)		Q_{gs}	--	4.1	--	
Gate-Drain Charge ^(Note 4,5)		Q_{gd}	--	5.2	--	
Input Capacitance	$V_{DS} = -30V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	C_{iss}	--	1250	--	pF
Output Capacitance		C_{oss}	--	85	--	
Reverse Transfer Capacitance		C_{rss}	--	65	--	
Switching						
Turn-On Delay Time ^(Note 4,5)	$V_{DD} = -30V, I_D = -1A,$ $R_{GEN} = 6$	$t_{d(on)}$	--	13	--	ns
Turn-On Rise Time ^(Note 4,5)		t_r	--	42.4	--	
Turn-Off Delay Time ^(Note 4,5)		$t_{d(off)}$	--	64.6	--	
Turn-Off Fall Time ^(Note 4,5)		t_f	--	16.4	--	
Source-Drain Diode Ratings and Characteristic						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I_S	--	--	-16	A
Maximum Pulse Drain-Source Diode Forward Current		I_{SM}	--	--	-64	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = -1A$	V_{SD}	--	--	-1	V

Note:

- Limited by maximum junction temperature
- Pulse width limited by safe operating area
- $L = 3.68\text{mH}, I_{AS} = 8A, V_{DD} = 50V, R_G = 25 \Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: pulse width $m300\mu s$, duty cycle $m2\%$
- Switching time is essentially independent of operating temperature



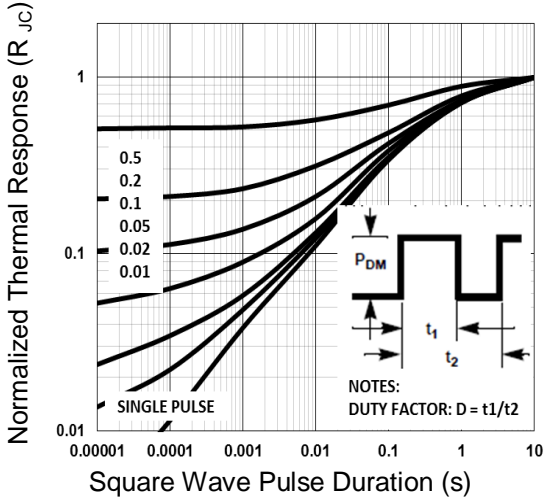
Electrical Characteristics Curve



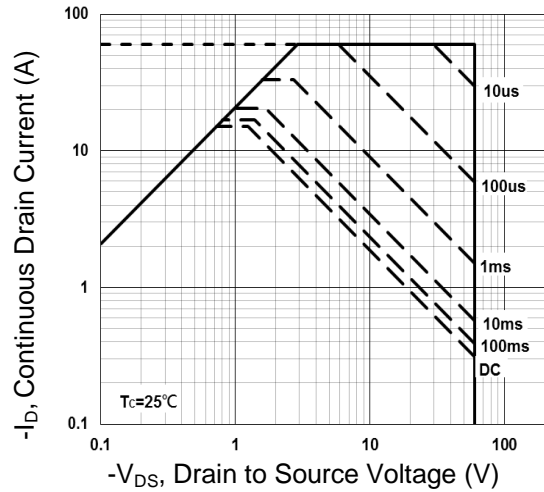


Electrical Characteristics Curve

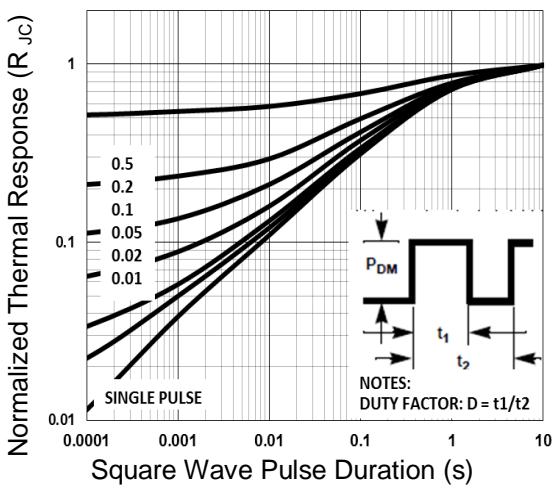
Normalized Transient Impedance (ITO-220)



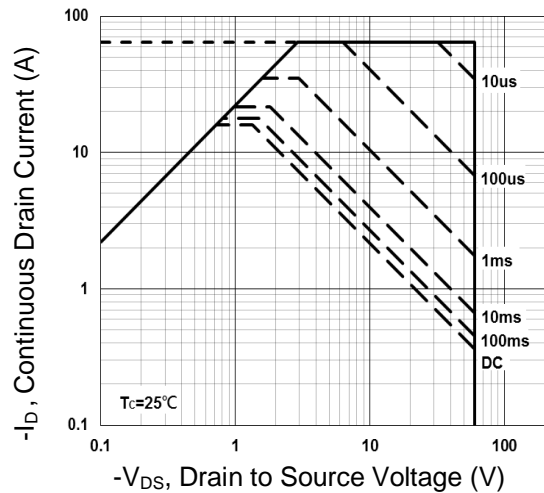
Maximum Safe Operation Area (ITO-220)



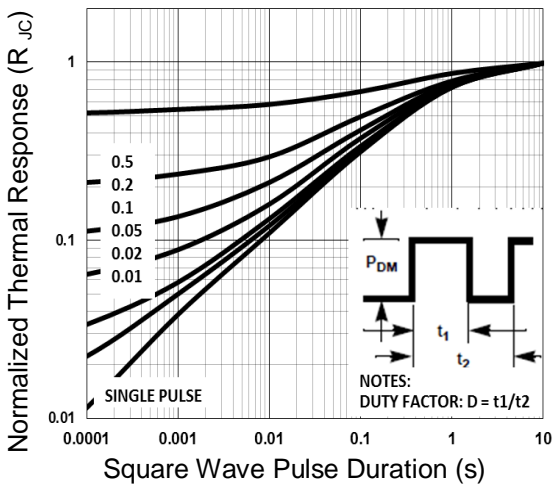
Normalized Transient Impedance (TO-251S)



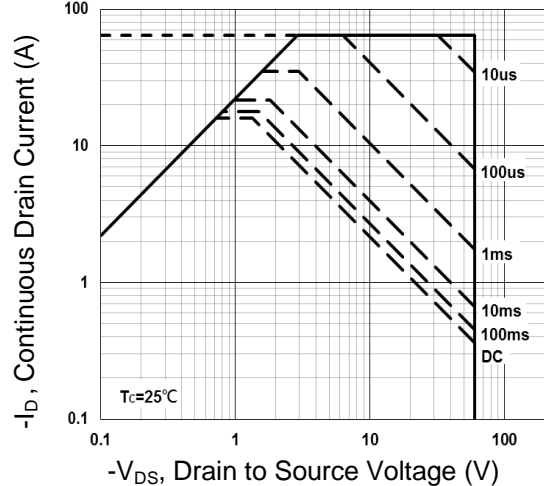
Maximum Safe Operation Area (TO-251S)



Normalized Transient Impedance (TO-252)

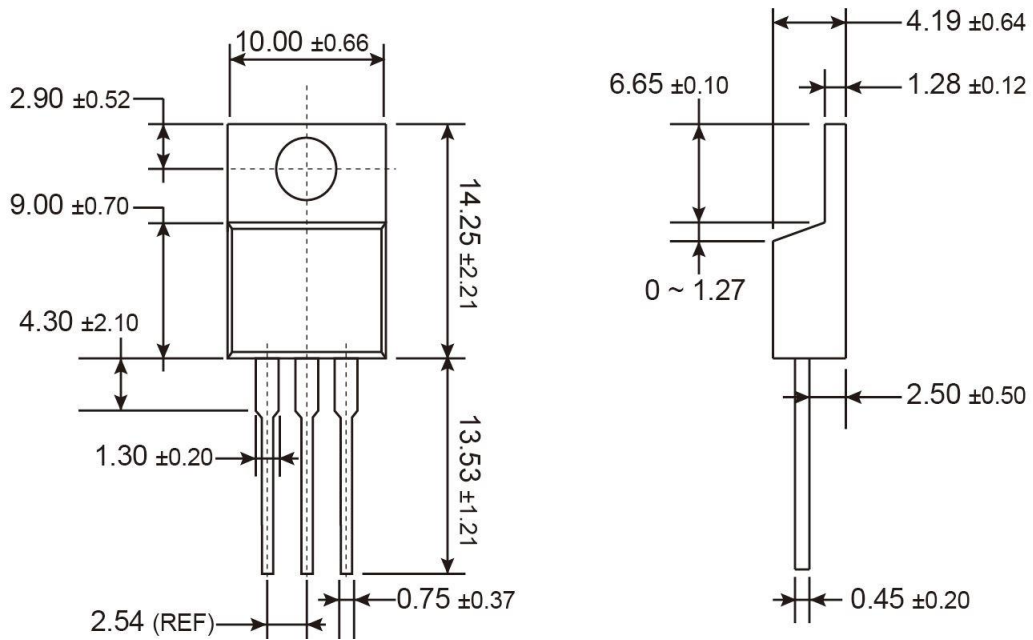


Maximum Safe Operation Area (TO-252)



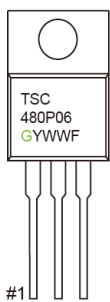


TO-220 Mechanical Drawing



Unit: Millimeters

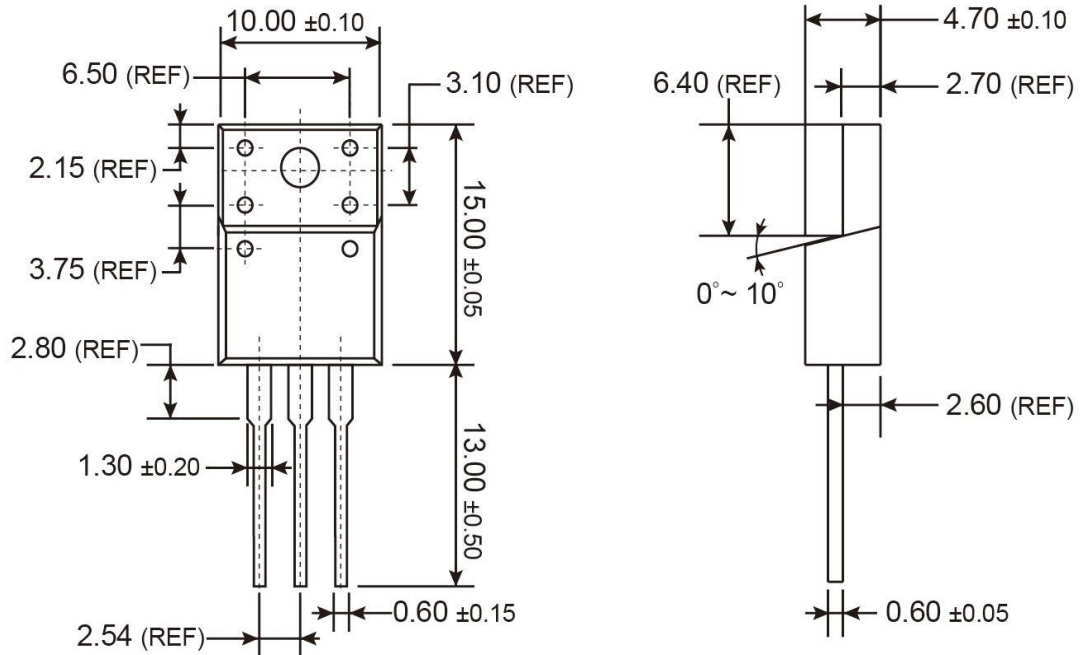
Marking Diagram



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



ITO-220 Mechanical Drawing



Unit: Millimeters

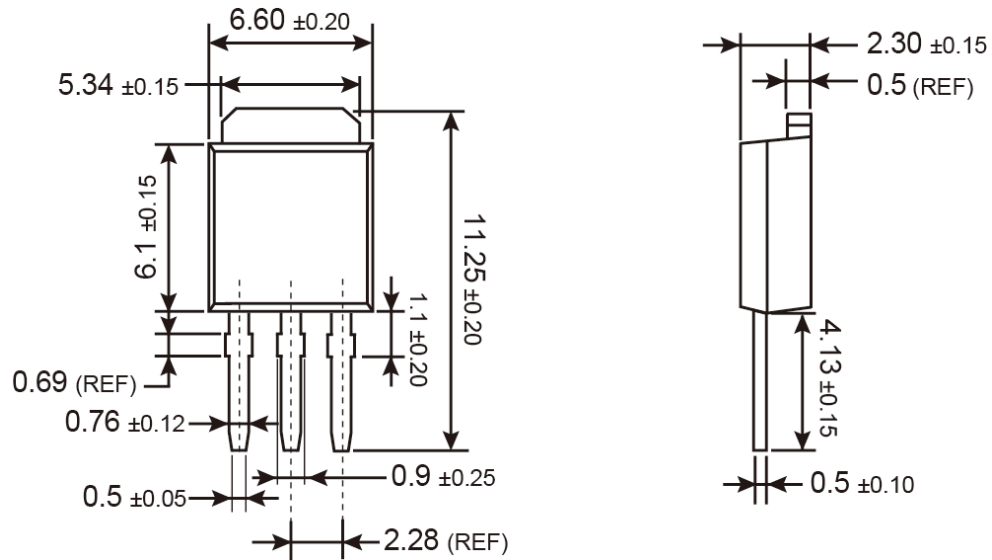
Marking Diagram



- G** = Halogen Free
- Y** = Year Code
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- F** = Factory Code

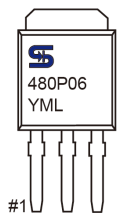


TO-251S Mechanical Drawing



Unit: Millimeters

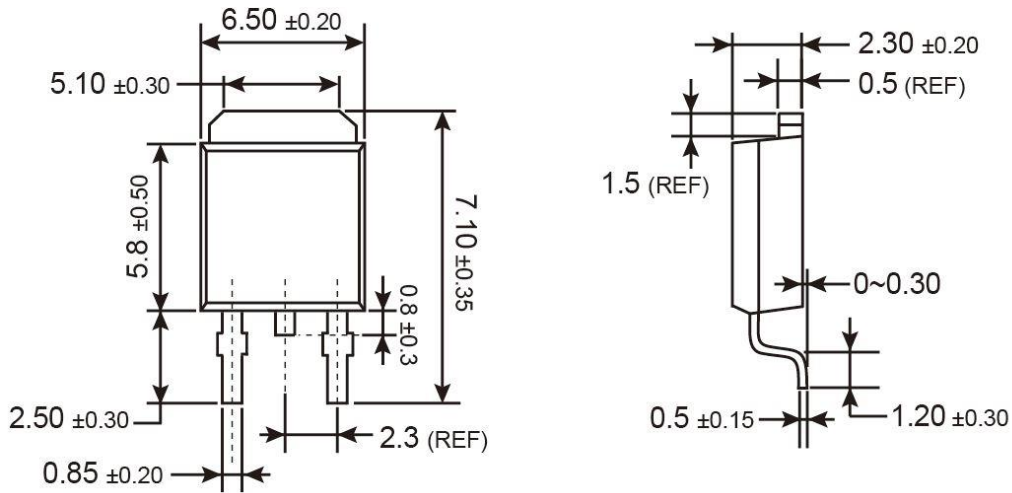
Marking Diagram



- 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

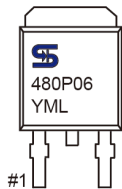


TO-252 Mechanical Drawing



Unit: Millimeters

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

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