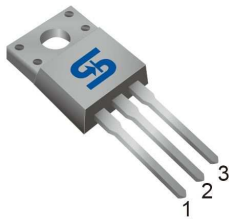
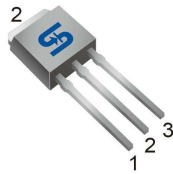




ITO-220



TO-251 (IPAK)



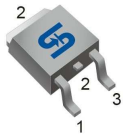
**Pin Definition:**

1. Gate
2. Drain
3. Source

**Key Parameter Performance**

Parameter	Value	Unit
$V_{DS}$	500	V
$R_{DS(on)}$ (max)	1.4	$\Omega$
$Q_g$	25	nC

TO-252 (DPAK)



**Features**

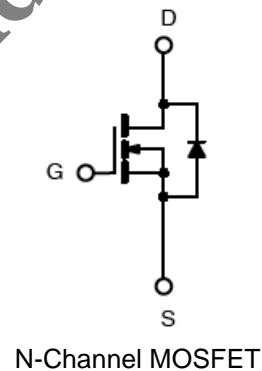
- Low  $R_{DS(ON)}$  1.4 $\Omega$  (Max.)
- Low gate charge typical @ 25nC (Typ.)
- Low  $C_{rss}$  typical @ 15pF (Typ.)
- Fast Switching

**Ordering Information**

Part No.	Package	Packing
TSM6N50CI C0G	ITO-220	50pcs / Tube
TSM6N50CP ROG	TO-252	2.5kpcs / 13" Reel
TSM6N50CH C5G	TO-251	75pcs / Tube

**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**



**Absolute Maximum Ratings** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	500	V	
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V	
Continuous Drain Current	$I_D$	$T_A = 25^\circ\text{C}$	5.6	A
		$T_A = 100^\circ\text{C}$	3	A
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	15	A	
Single Pulse Avalanche Energy <sup>(Note 2)</sup>	$E_{AS}$	180	mJ	
Avalanche Current (Repetitive) <sup>(Note 3)</sup>	$I_{AR}$	5	A	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_{TOT}$	ITO-220	25	W
		TO-252, TO-251	90	
Operating Junction Temperature	$T_J$	150	$^\circ\text{C}$	
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ\text{C}$	



### Thermal Performance

Parameter <sup>(Note 4)</sup>	Symbol	Limit	Unit	
Thermal Resistance - Junction to Case	R <sub>θJC</sub>	ITO-220	5	°C/W
		TO-252, TO-251	2.78	
Thermal Resistance - Junction to Ambient	R <sub>θJA</sub>	62.5	°C/W	

### Electrical Specifications (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	BV <sub>DSS</sub>	500	--	--	V
Drain-Source On-State Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 2.8A	R <sub>DS(ON)</sub>	--	1.15	1.4	Ω
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	V <sub>GS(TH)</sub>	2.0	--	4.0	V
Zero Gate Voltage Drain Current	V <sub>DS</sub> = 500V, V <sub>GS</sub> = 0V	I <sub>DSS</sub>	--	--	1	μA
Gate Body Leakage	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±10	μA
Forward Transfer Conductance	V <sub>DS</sub> = 8V, I <sub>D</sub> = 1A	g <sub>fs</sub>	--	2.6	--	S

<b>Dynamic</b> <sup>(Note 5,6)</sup>						
Total Gate Charge	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 400V, I <sub>D</sub> = 5A, V <sub>GS</sub> = 10V	Q <sub>g</sub>	--	25	33	nC
Gate-Source Charge		Q <sub>gs</sub>	--	5	--	
Gate-Drain Charge		Q <sub>gd</sub>	--	10	--	
Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0 MHz	C <sub>iss</sub>	--	680	900	pF
Output Capacitance		C <sub>oss</sub>	--	85	110	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	15	20	

<b>Switching</b> <sup>(Note 5,6)</sup>						
Turn-On Delay Time	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5A, V <sub>DD</sub> = 250V, R <sub>G</sub> = 25Ω	t <sub>d(on)</sub>	--	20	50	ns
Turn-On Rise Time		t <sub>r</sub>	--	40	90	
Turn-Off Delay Time		t <sub>d(off)</sub>	--	90	190	
Turn-Off Fall Time		t <sub>f</sub>	--	45	100	

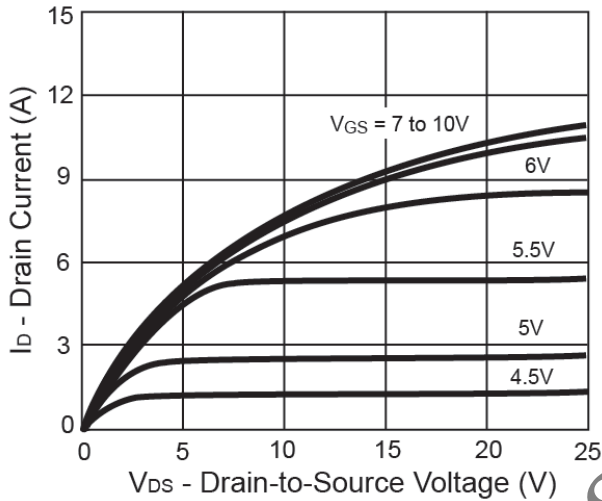
<b>Source-Drain Diode Ratings and Characteristic</b>						
Source Current	Integral reverse diode in the MOSFET	I <sub>S</sub>	--	--	5	A
Source Current (Pulse)		I <sub>SM</sub>	--	--	15	A
Diode Forward Voltage	I <sub>S</sub> = 5A, V <sub>GS</sub> = 0V	V <sub>SD</sub>	--	--	1.6	V
Reverse Recovery Time	V <sub>GS</sub> = 0V, I <sub>S</sub> = 5A,	t <sub>fr</sub>	--	430	--	ns
Reverse Recovery Charge	di <sub>F</sub> /dt = 100A/μs	Q <sub>fr</sub>	--	2	--	μC

#### Note:

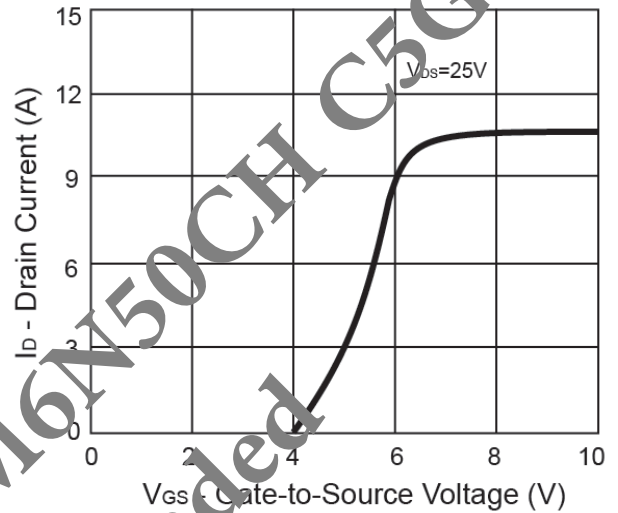
- Limited by maximum junction temperature
- V<sub>DD</sub> = 50V, I<sub>AS</sub> = 5A, L = 10mH, Starting T<sub>J</sub> = 25°C
- Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
- Surface mounted on FR4 board t ≤ 10sec
- Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%
- Essentially Independent of Operating Temperature

### Electrical Characteristics Curves

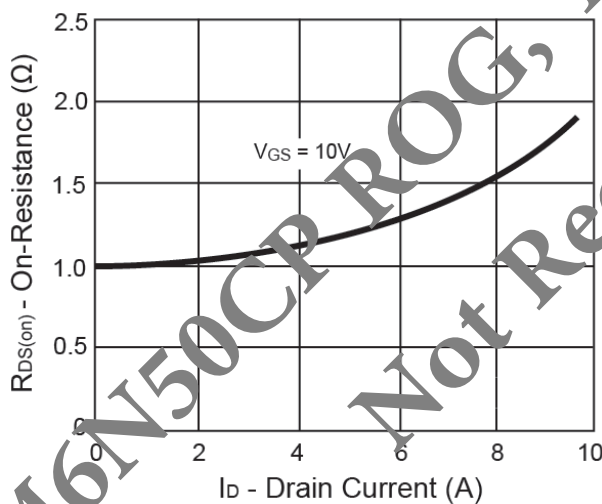
**Output Characteristics**



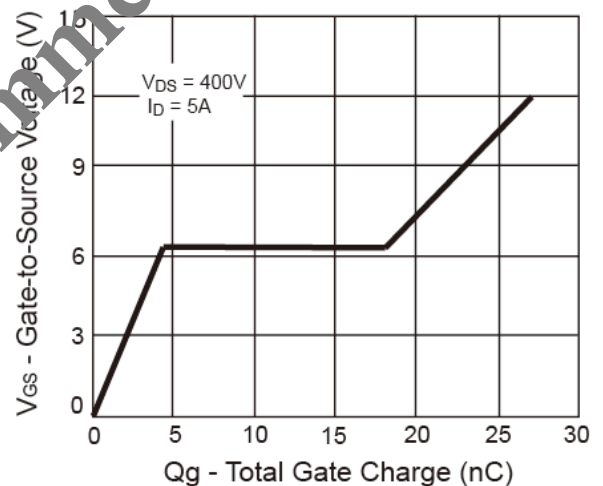
**Transfer Characteristics**



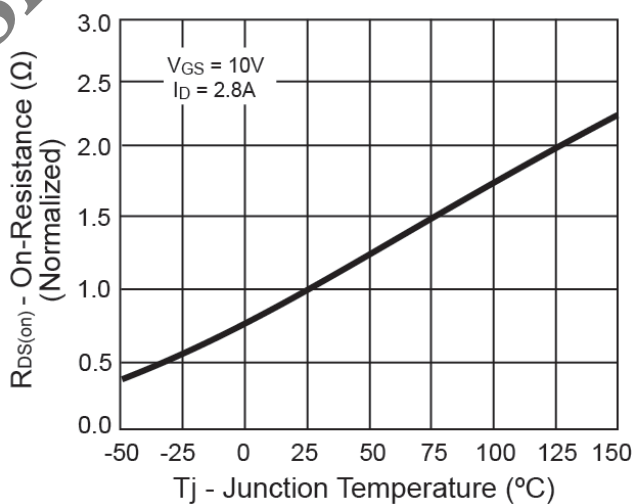
**On-Resistance vs. Drain Current**



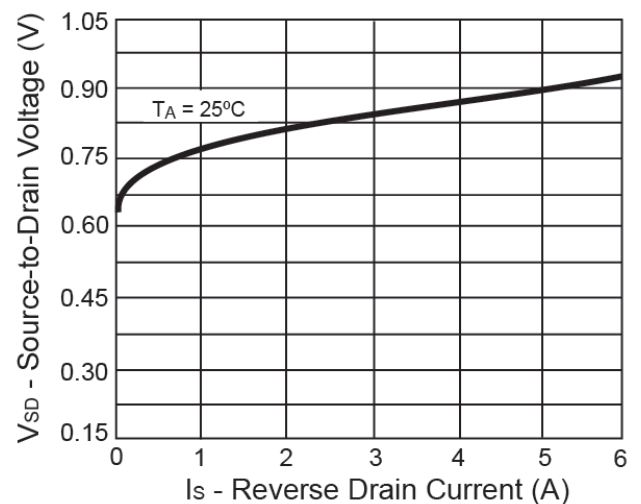
**Gate Charge**



**On-Resistance vs. Junction Temperature**

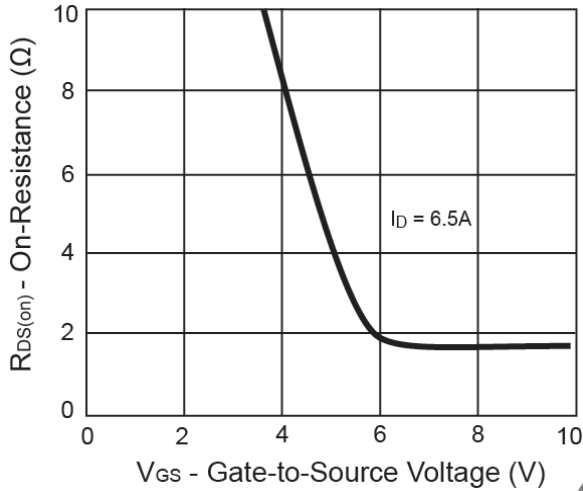


**Source-Drain Diode Forward Voltage**

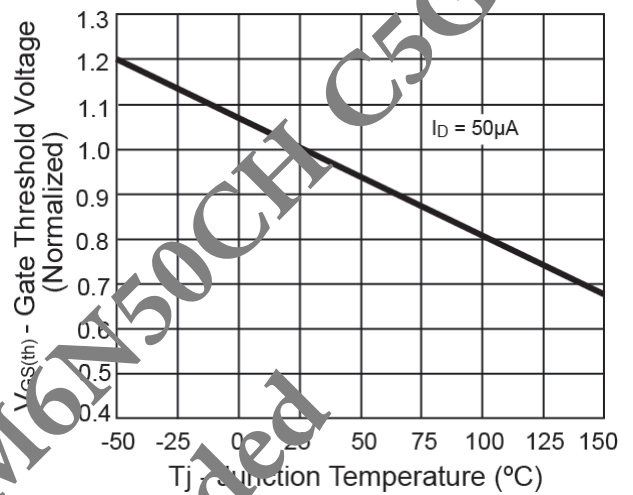


**Electrical Characteristics Curves**

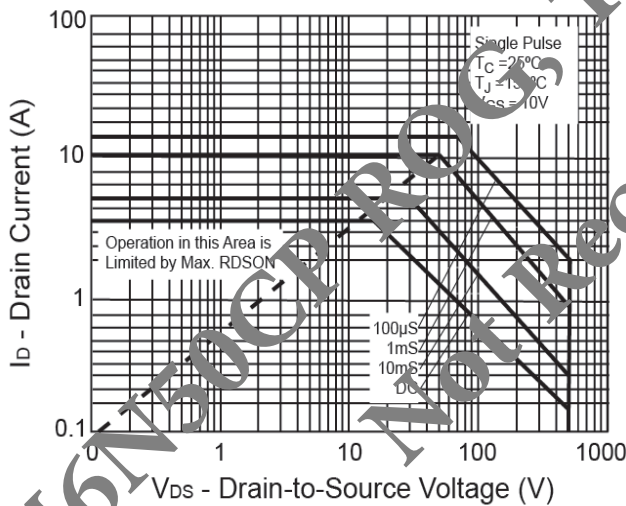
**On-Resistance vs. Gate-Source Voltage**



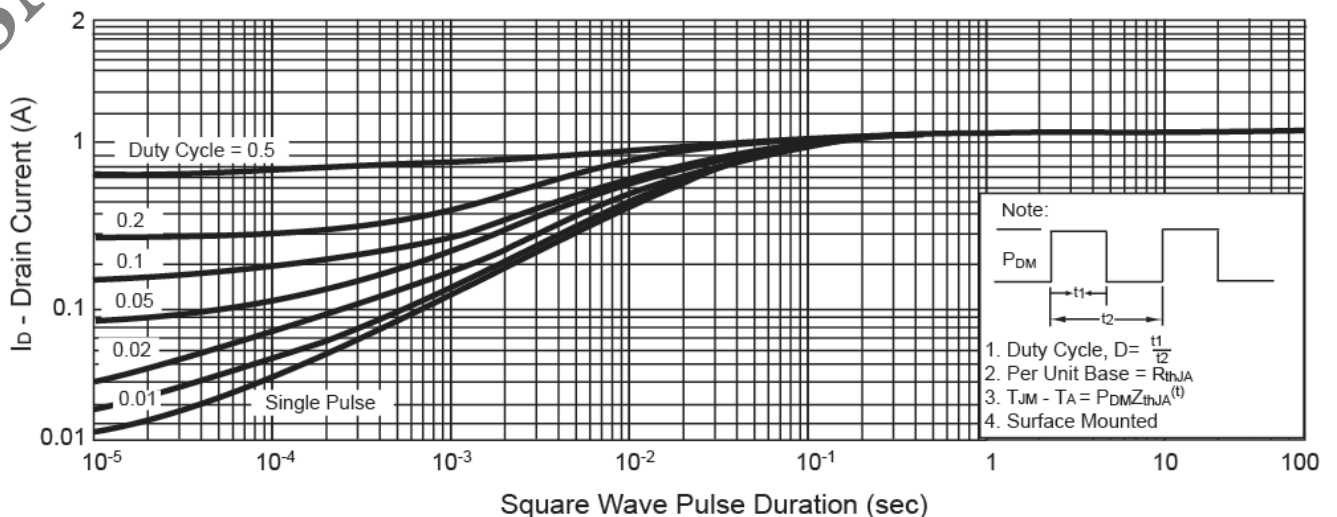
**Threshold Voltage**



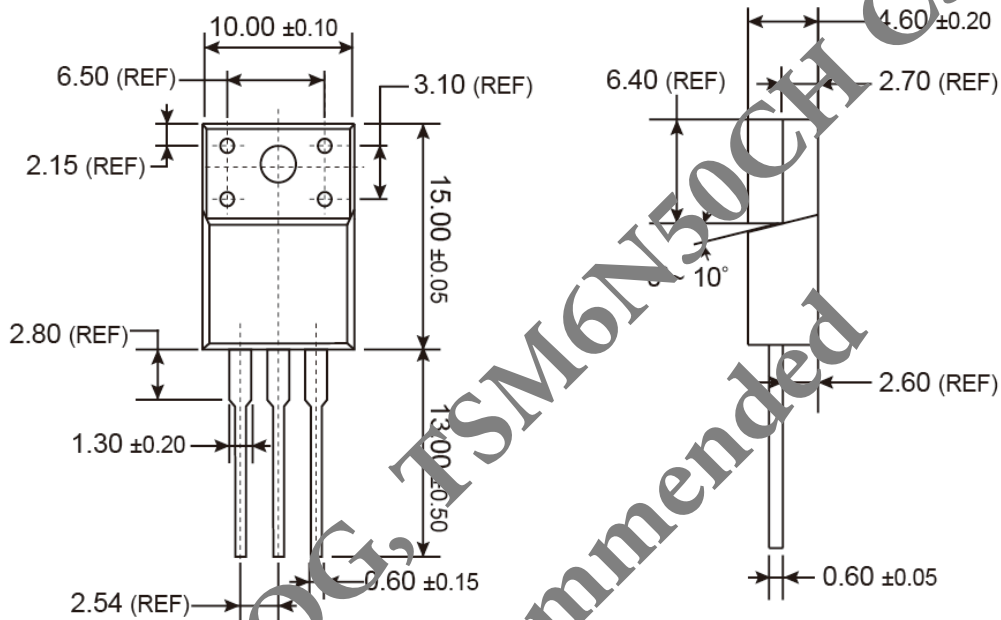
**Maximum Safe Operating Area**



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

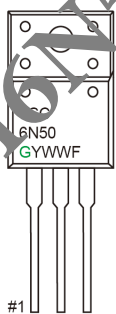


**ITO-220 Mechanical Drawing**



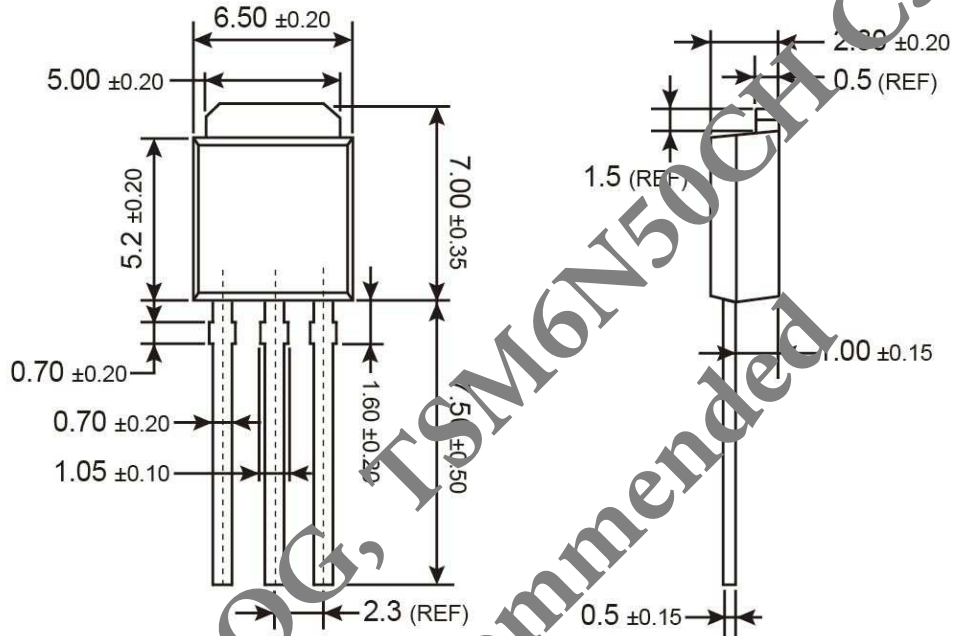
Unit: Millimeters

**Marking Diagram**



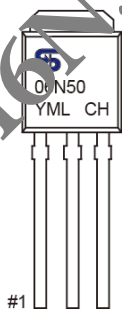
- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01~52)
- F** = Factory Code

**TO-251 (IPAK) Mechanical Drawing**



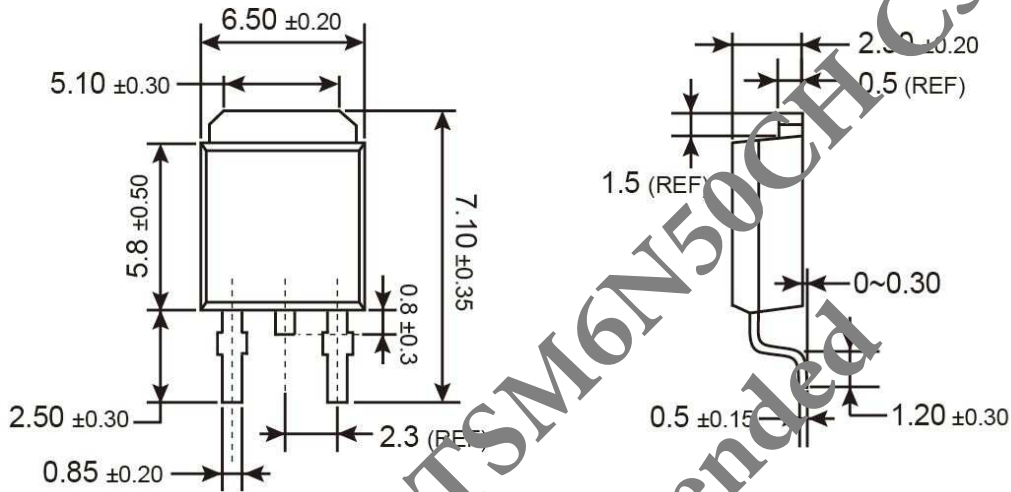
Unit: Millimeters

**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

TSM6N50CP ROG, TSM6N50CH C5G  
Not Recommended

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