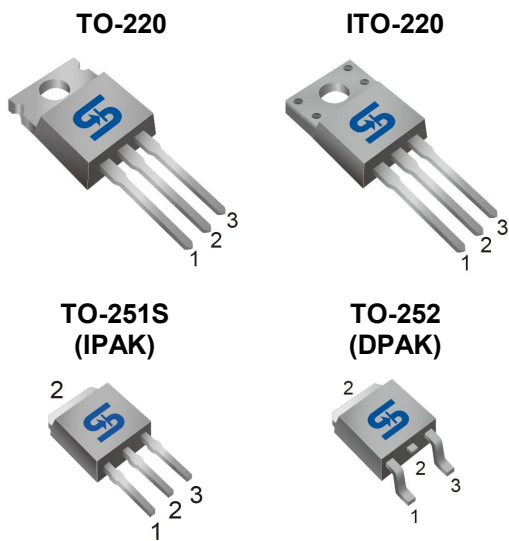


# TSM340N06

## 60V N-Channel Power MOSFET



**Pin Definition:**  
1. Gate  
2. Drain  
3. Source

### Key Parameter Performance

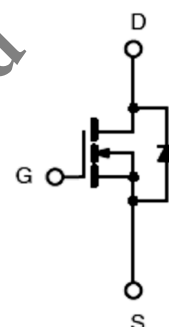
Parameter	Value	Unit
$V_{DS}$	60	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	34
	$V_{GS} = 4.5V$	40
$Q_g$	16.6	nC

### Ordering Information

Part No.	Package	Packing
TSM340N06CI C0G	ITO-220	50pcs / Tube
TSM340N06CZ C0G	TO-220	50pcs / Tube
TSM340N06CH X0G	TO-251S	75pcs / Tube
TSM340N06CP 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



N-Channel MOSFET

### Absolute Maximum Ratings (Tc = 25°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)	$I_D$	30			A
		19			A
Pulsed Drain Current (Note 2)	$I_{DM}$	120			A
Single Pulse Avalanche Energy (Note 3)	$E_{AS}$	24			mJ
Single Pulse Avalanche Current (Note 2)	$I_{AS}$	22			A
Total Power Dissipation @ Tc = 25°C	$P_D$	40	27	66	W
Operating Junction Temperature	$T_J$	150			°C
Storage Temperature Range	$T_{STG}$	-55 to +150			°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)

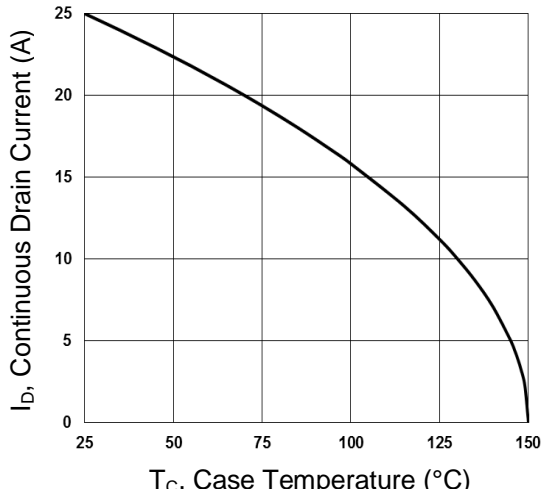
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	$BV_{DSS}$	60	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{V}, I_D = 15\text{A}$	$R_{DS(ON)}$	--	28	34	m
	$V_{GS} = 4.5\text{V}, I_D = 10\text{A}$		--	33	40	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	1.2	1.7	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 60\text{V}, V_{GS} = 0\text{V}$	$I_{DSS}$	--	--	1	$\mu\text{A}$
	$V_{DS} = 48\text{V}, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	$I_{GSS}$	--	--	$\pm 100$	nA
Forward Transconductance	$V_{DS} = 10\text{V}, I_D = 8\text{A}$	$g_{fs}$	--	8	--	S
<b>Dynamic</b>						
Total Gate Charge (Note 4,5)	$V_{DS} = 30\text{V}, I_D = 20\text{A}, V_{GS} = 10\text{V}$	$Q_g$	--	16.6	--	nC
Gate-Source Charge (Note 4,5)		$Q_{GS}$	--	2.2	--	
Gate-Drain Charge (Note 4,5)		$Q_{gd}$	--	3.9	--	
Input Capacitance	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$	$C_{iss}$	--	1180	--	pF
Output Capacitance		$C_{oss}$	--	68	--	
Reverse Transfer Capacitance		$C_{rss}$	--	45	--	
Gate Resistance		$R_g$	--	2.1	--	
<b>Switching</b>						
Turn-On Delay Time (Note 4,5)	$V_{DD} = 30\text{V}, V_{GS} = 10\text{V}, R_G = 6\Omega, I_D = -1\text{A}$	$t_{d(on)}$	--	4.6	--	ns
Turn-On Rise Time (Note 4,5)		$t_r$	--	14.8	--	
Turn-Off Delay Time (Note 4,5)		$t_{d(off)}$	--	27.2	--	
Turn-Off Fall Time (Note 4,5)		$t_f$	--	7.8	--	
<b>Source-Drain Diode Ratings and Characteristic</b>						
Continuous Drain-Source Diode	$V_G = V_D = 0\text{V}, \text{Force Current}$	$I_S$	--	--	25	A
Pulse Drain-Source Diode		$I_{SM}$	--	--	100	A
Diode-Source Forward Voltage	$V_{GS} = 0\text{V}, I_S = 1\text{A}$	$V_{SD}$	--	--	1	V
Reverse Recovery Time (Note 4)	$V_{GS} = 0\text{V}, I_S = 1\text{A}$	$t_{rr}$	--	17	--	ns
Reverse Recovery Charge (Note 4)	$di_f/dt = 100\text{A}/\mu\text{s}$	$Q_{rr}$	--	12	--	nC

### Note:

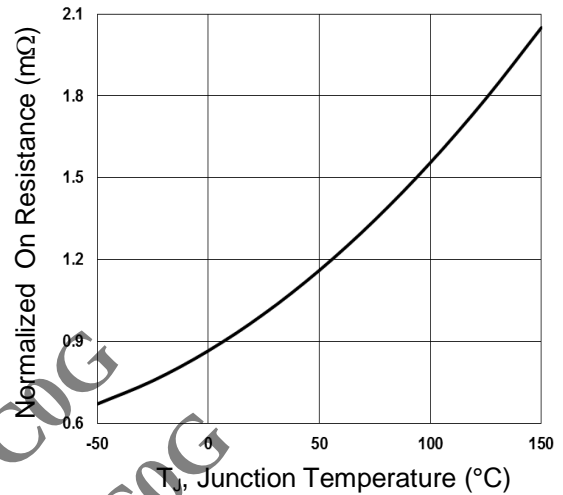
- Limited by maximum junction temperature
- Pulse width limited by safe operating area
- $L = 0.1\text{mH}, I_{AS} = 22\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , Starting  $T_J = 25^\circ\text{C}$
- Pulse test: pulse width  $m300\mu\text{s}$ , duty cycle  $m2\%$
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curve

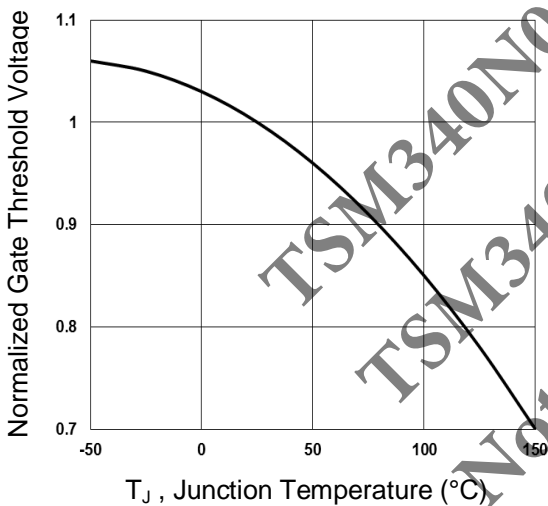
**Continuous Drain Current vs. T<sub>c</sub>**



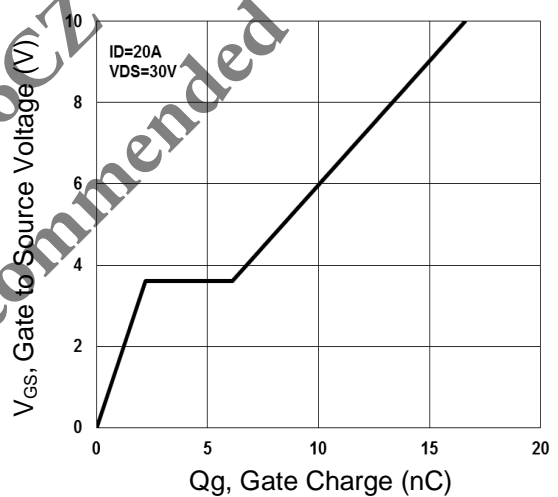
**Normalized RDSON vs. T<sub>J</sub>**



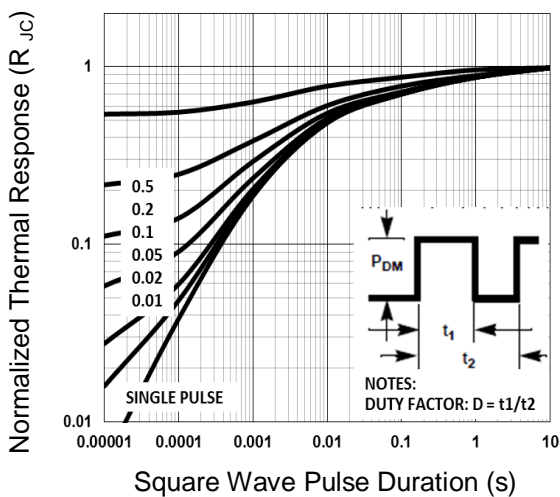
**Normalized V<sub>th</sub> vs. T<sub>J</sub>**



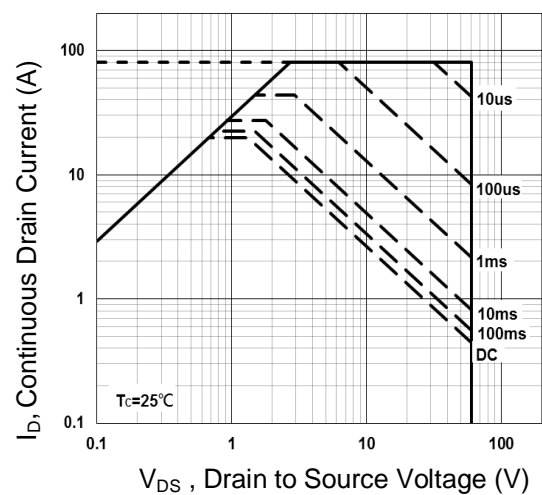
**Gate Charge Waveform**



**Normalized Transient Impedance (ITO-220)**



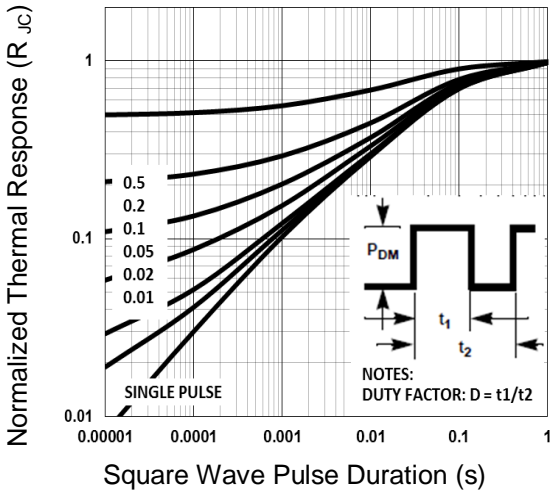
**Maximum Safe Operation Area (ITO-220)**



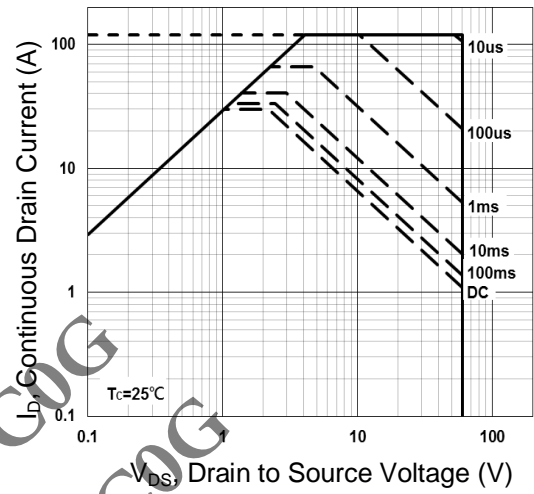


### Electrical Characteristics Curve

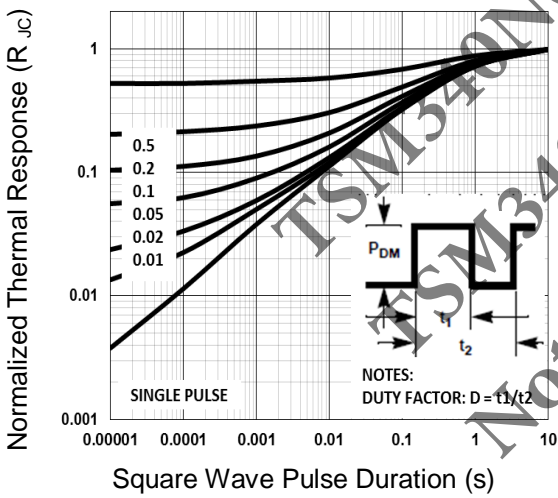
**Normalized Transient Impedance (TO-220)**



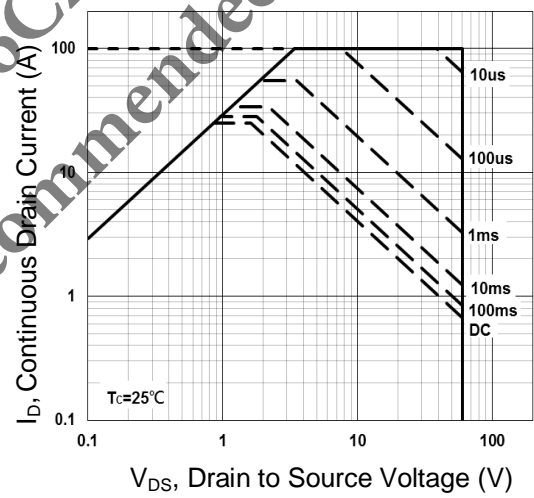
**Maximum Safe Operation Area (TO-220)**



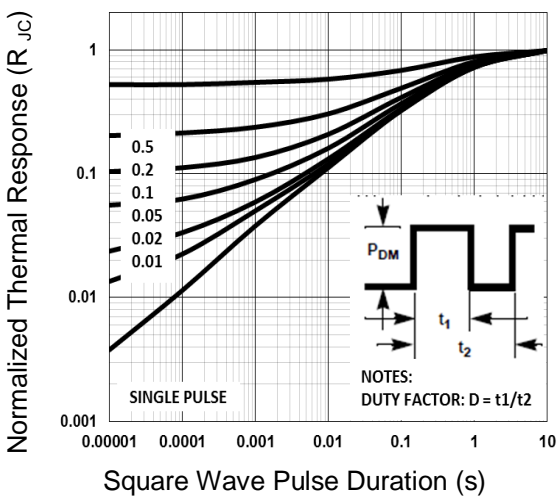
**Normalized Transient Impedance (TO-251S)**



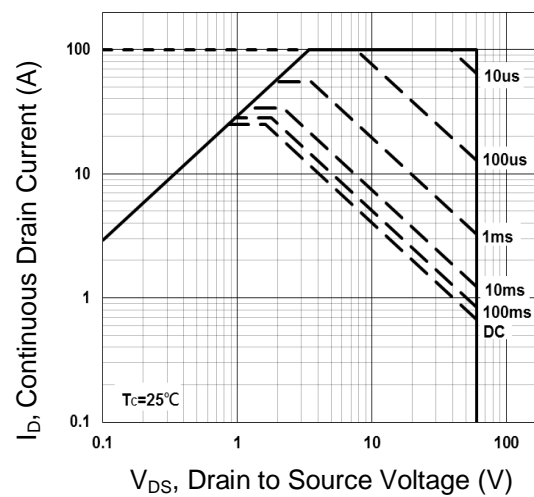
**Maximum Safe Operation Area (TO-251S)**



**Normalized Transient Impedance (TO-252)**

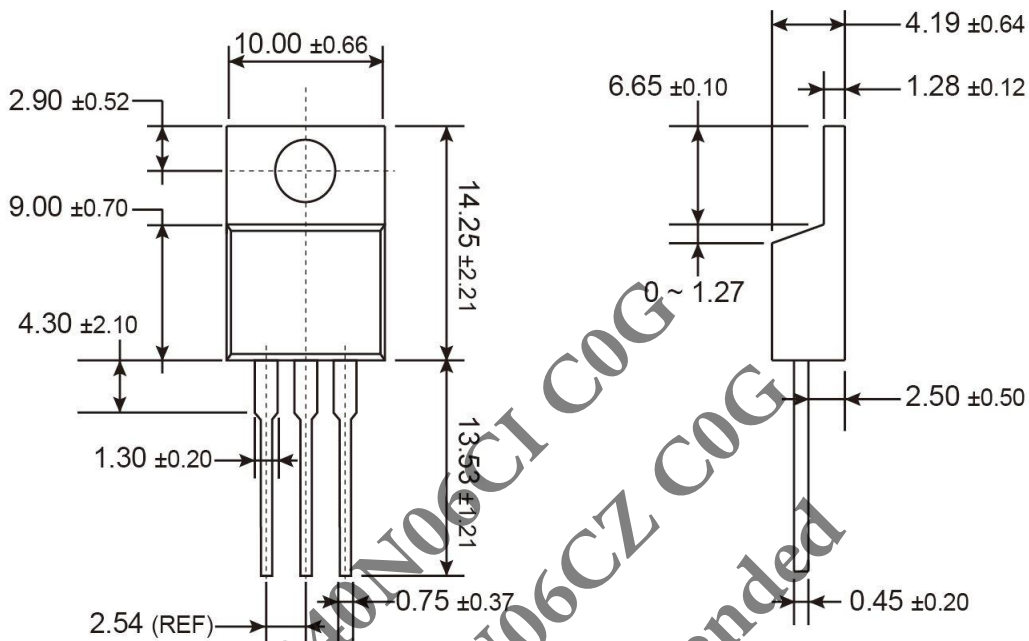


**Maximum Safe Operation Area (TO-252)**



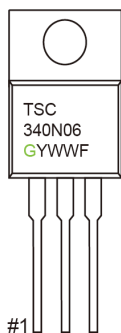


**TO-220 Mechanical Drawing**



Unit: Millimeters

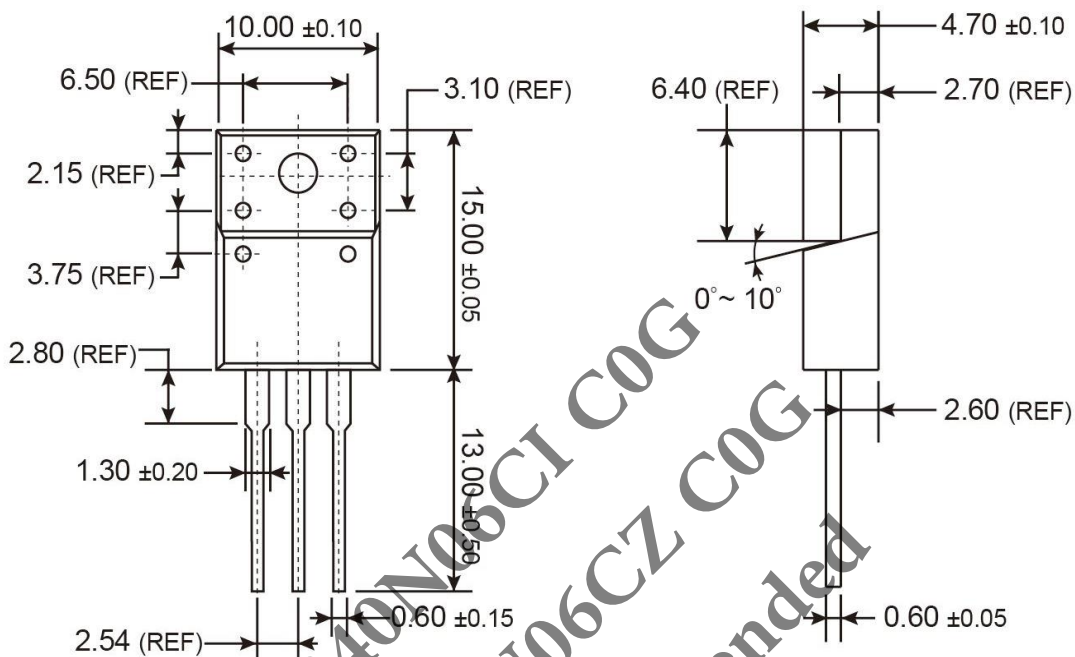
**Marking Diagram**



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

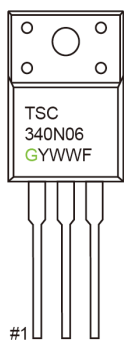


### ITO-220 Mechanical Drawing



Unit: Millimeters

### Marking Diagram

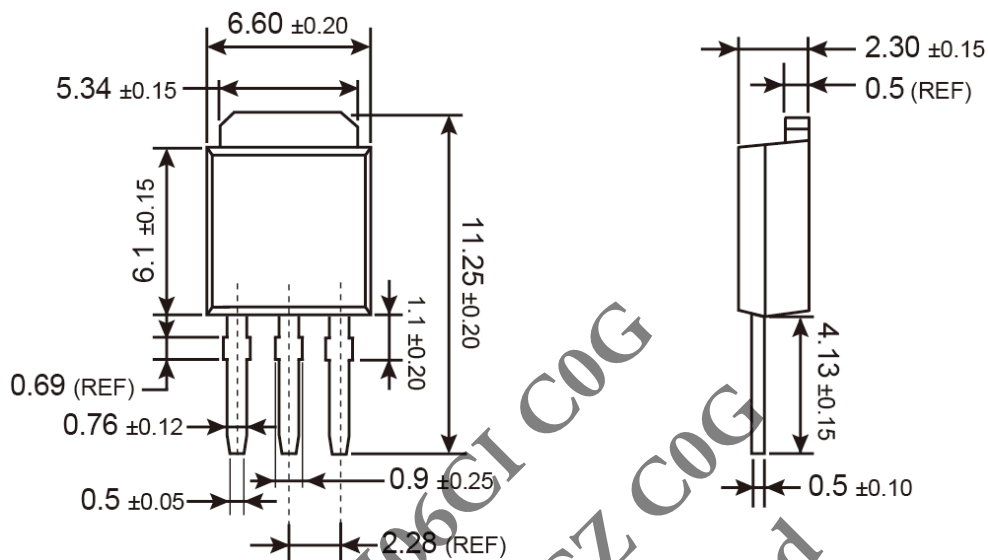


- G** = Halogen Free
- Y** = Year Code
- WW** = Week Code (01-52)
- F** = Factory Code

TSM340N06CI COG  
TSM340N06CZ COG  
Not Recommended

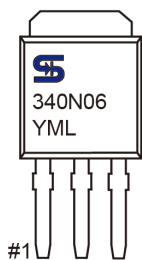


### TO-251S Mechanical Drawing



Unit: Millimeters

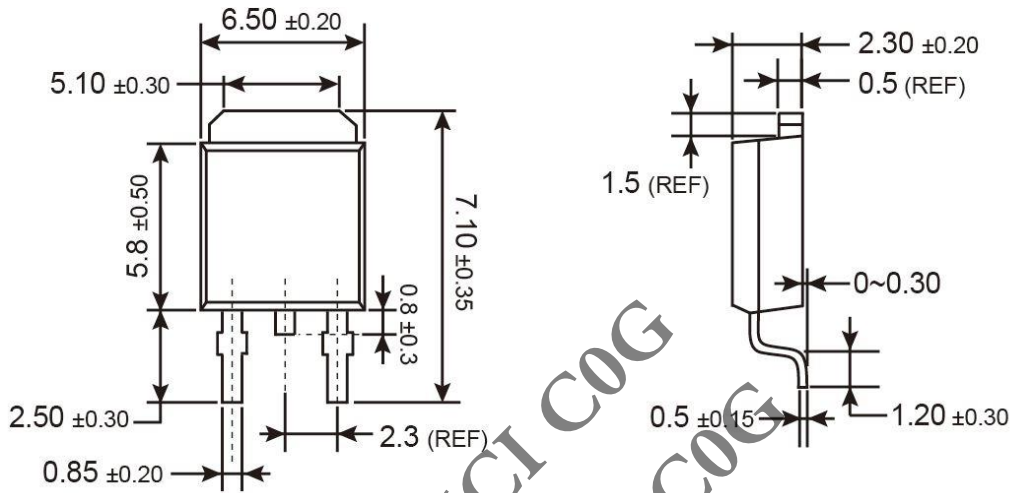
### Marking Diagram



- 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

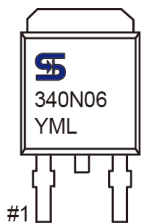


**TO-252 Mechanical Drawing**



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



TSM340N06CI COG  
TSM340N06CZ COG  
Not Recommended

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