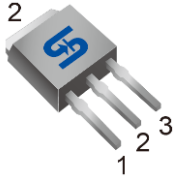


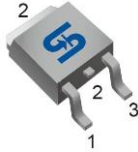
# TSM900N06

## 60V N-Channel Power MOSFET

**TO-251S  
(IPAK SL)**



**TO-252  
(DPAK)**



**Pin Definition:**

1. Gate
2. Drain
3. Source

**Key Parameter Performance**

Parameter	Value	Unit
$V_{DS}$	60	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	90
	$V_{GS} = 4.5V$	100
$Q_g$	9.3	nC

**SOT-223**

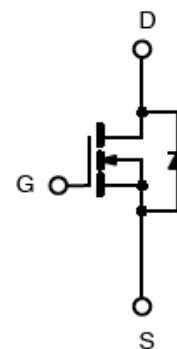


**Ordering Information**

Part No.	Package	Packing
TSM900N06CH X0G	TO-251S	75pcs / Tube
TSM900N06CP ROG	TO-252	2.5kpcs / 13" Reel
TSM900N06CW RPG	SOT-223	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** ( $T_c = 25^\circ C$  unless otherwise noted)

Parameter	Symbol	Limit			Unit	
		IPAK	DPAK	SOT-223		
Drain-Source Voltage	$V_{DS}$	60			V	
Gate-Source Voltage	$V_{GS}$	$\pm 20$			V	
Continuous Drain Current <sup>(Note 1)</sup>	$I_D$	$T_c = 25^\circ C$			A	
		$T_c = 100^\circ C$			A	
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	44			A	
Single Pulse Avalanche Energy <sup>(Note 3)</sup>	$E_{AS}$	25			mJ	
Single Pulse Avalanche Current <sup>(Note 3)</sup>	$I_{AS}$	7			A	
Total Power Dissipation	$P_D$	@ $T_c = 25^\circ C$	25	25	4.17	W
Derate above $T_c = 25^\circ C$		0.2	0.2	0.014	W/ $^\circ C$	
Operating Junction Temperature	$T_J$	150			$^\circ C$	
Storage Temperature Range	$T_{STG}$	-55 to +150			$^\circ C$	

### Thermal Performance

Parameter	Symbol	Limit			Unit
		IPAK	DKPAK	SOT-223	
Thermal Resistance - Junction to Case	$R_{\theta JC}$	5	5	30	$^{\circ}C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	62	70	$^{\circ}C/W$

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	60	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 6A$	$R_{DS(ON)}$	--	76	90	m $\Omega$
	$V_{GS} = 4.5V, I_D = 3A$		--	87	100	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.2	1.8	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 60V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
	$V_{DS} = 48V, T_J = 125^{\circ}C$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	$\mu A$
Forward Transconductance	$V_{DS} = 10V, I_D = 3A$	$g_{fs}$	--	4	--	S

<b>Dynamic</b>						
Total Gate Charge <sup>(Note 4,5)</sup>	$V_{DS} = 48V, I_D = 6A, V_{GS} = 10V$	$Q_g$	--	9.3	--	nC
Gate-Source Charge <sup>(Note 4,5)</sup>		$Q_{gs}$	--	2.1	--	
Gate-Drain Charge <sup>(Note 4,5)</sup>		$Q_{gd}$	--	1.8	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V, f = 1MHz$	$C_{iss}$	--	500	--	pF
Output Capacitance		$C_{oss}$	--	45	--	
Reverse Transfer Capacitance		$C_{rss}$	--	16	--	
Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	$R_g$	--	2	--	$\Omega$

<b>Switching</b>						
Turn-On Delay Time <sup>(Note 4,5)</sup>	$V_{DD} = 30V, V_{GS} = 10V, R_G = 3.3\Omega, I_D = -1A$	$t_{d(on)}$	--	2.9	--	ns
Turn-On Rise Time <sup>(Note 4,5)</sup>		$t_r$	--	9.5	--	
Turn-Off Delay Time <sup>(Note 4,5)</sup>		$t_{d(off)}$	--	18.4	--	
Turn-Off Fall Time <sup>(Note 4,5)</sup>		$t_f$	--	5.3	--	

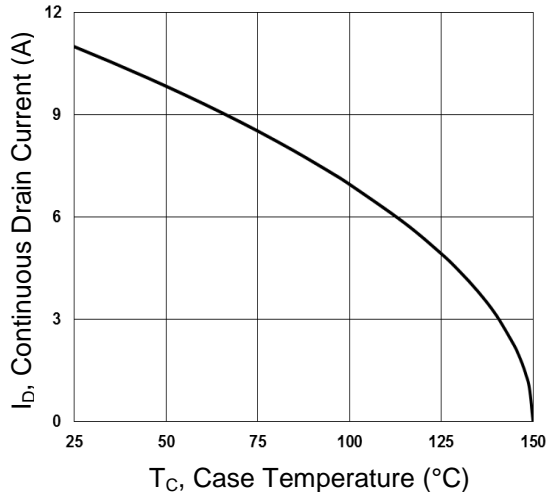
<b>Source-Drain Diode Ratings and Characteristic</b>						
Continuous Drain-Source Diode	$V_G = V_D = 0V, \text{Force Current}$	$I_S$	--	--	11	A
Pulse Drain-Source Diode		$I_{SM}$	--	--	44	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = 1A$	$V_{SD}$	--	--	1.2	V
Reverse Recovery Time <sup>(Note 4)</sup>	$V_{GS} = 30V, I_S = 1A$	$t_{rr}$	--	23.2	--	ns
Reverse Recovery Charge <sup>(Note 4)</sup>		$dI_F/dt = 100A/\mu s$	$Q_{rr}$	--	14.3	--

#### Note:

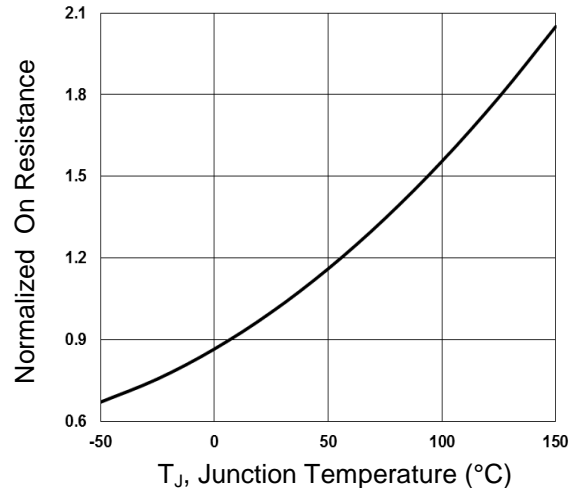
- Limited by maximum junction temperature.
- Repetitive Rating : Pulsed width limited by maximum junction temperature.
- $V_{DD}=25V, V_{GS}=10V, L=1mH, I_{AS}=7A, R_G=25\Omega, \text{Starting } T_J= 25^{\circ}C$
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- Essentially independent of operating temperature.

### Electrical Characteristics Curve

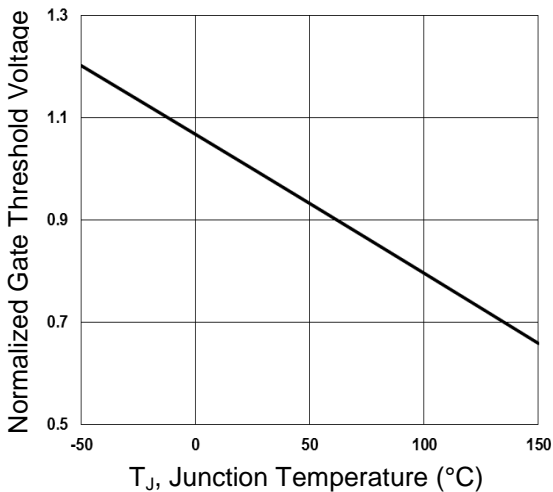
**Continuous Drain Current vs. T<sub>c</sub>**



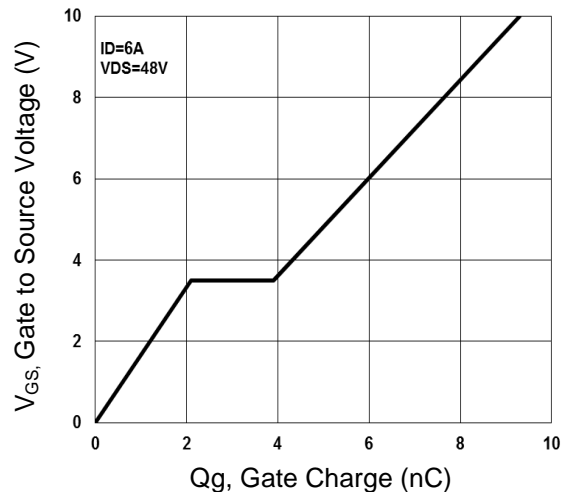
**Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



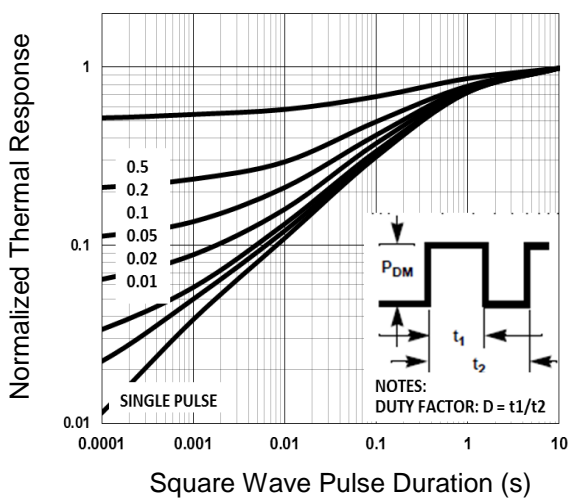
**Normalized V<sub>th</sub> vs. T<sub>J</sub>**



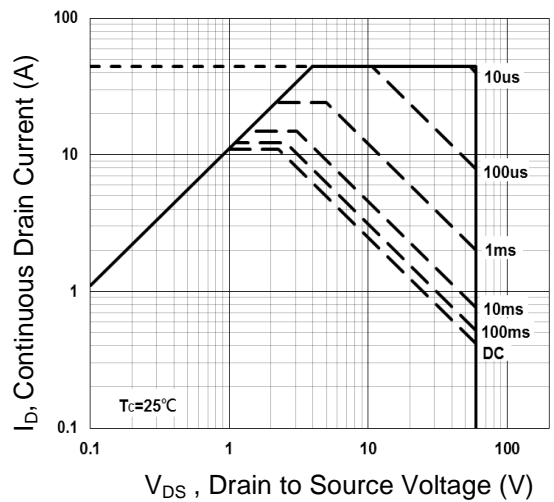
**Gate Charge Waveform**



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

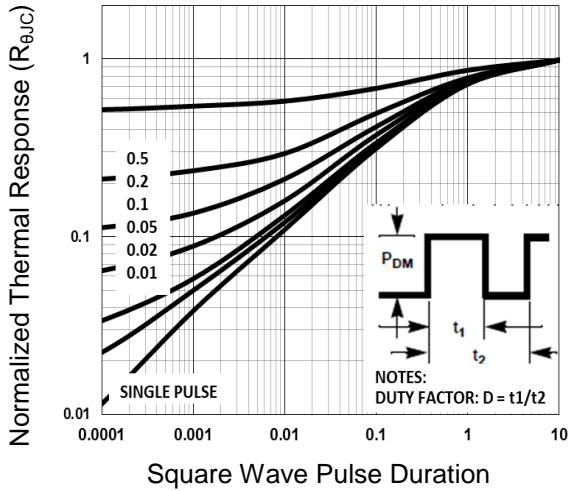


**Maximum Safe Operation Area (TO-251S)**

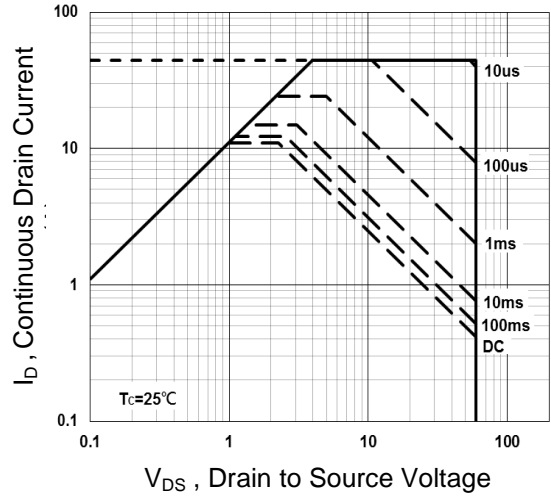


**Electrical Characteristics Curve** ( $T_c=25^\circ\text{C}$ , unless otherwise noted)

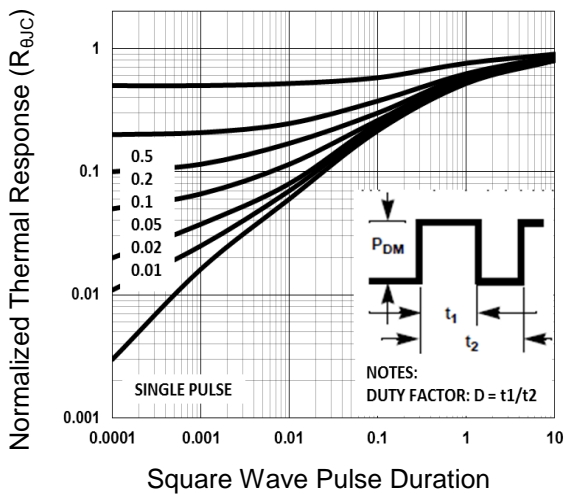
**Normalized Transient Impedance (TO-252)**



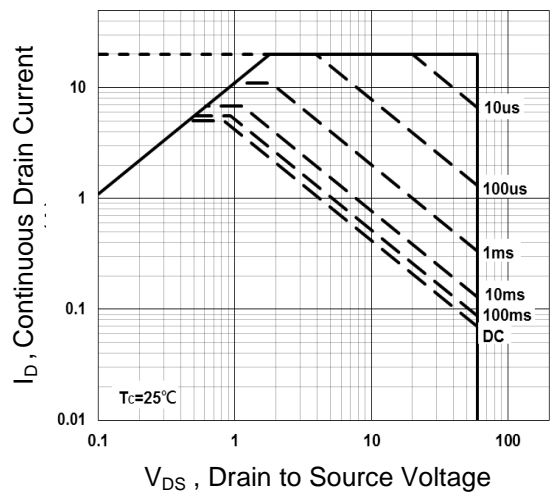
**Maximum Safe Operation Area (TO-252)**



**Normalized Transient Impedance (SOT-223)**

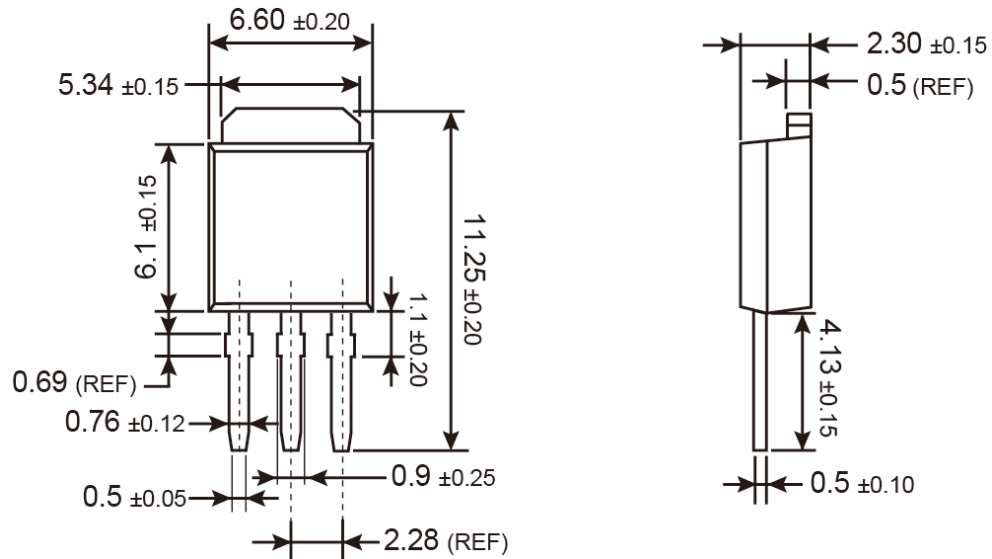


**Maximum Safe Operation Area (SOT-223)**



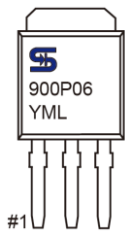


### TO-251S Mechanical Drawing



Unit: Millimeters

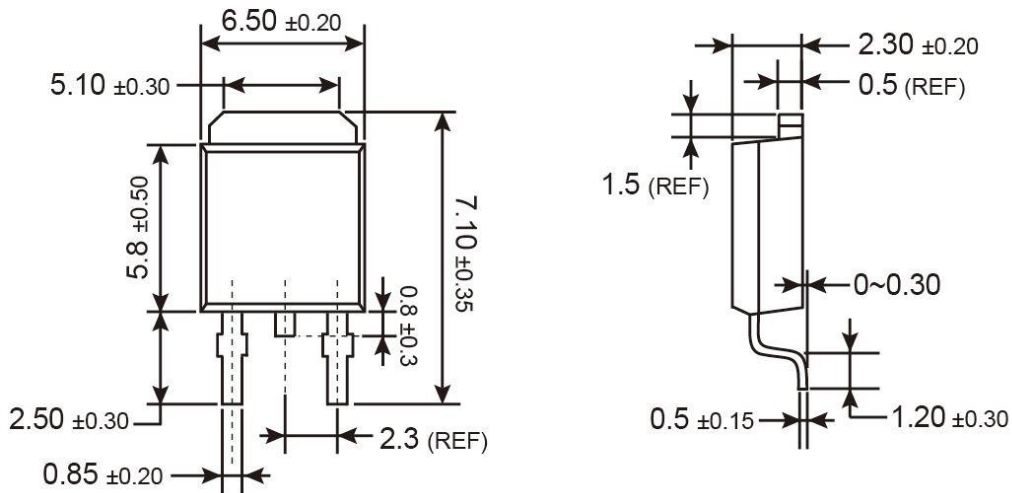
### Marking Diagram



- 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

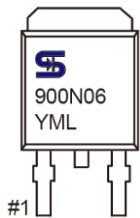


### TO-252 Mechanical Drawing



Unit: Millimeters

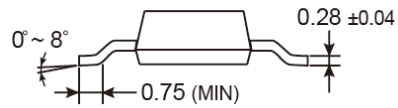
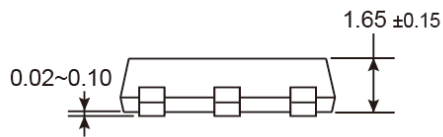
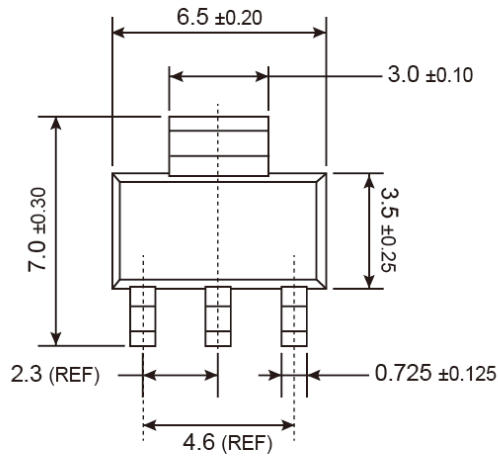
### Marking Diagram



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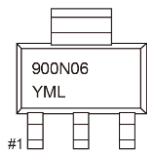


### SOT-223 Mechanical Drawing



Unit: Millimeters

### Marking Diagram



- Y** = Year Code
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