

# TSM060N03CP

## 30V N-Channel Power MOSFET



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

### Key Parameter Performance

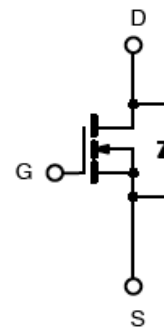
Parameter	Value	Unit
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	6
	$V_{GS} = 4.5V$	9
$Q_g$	11.1	nC

### Ordering Information

Part No.	Package	Packing
TSM060N03CP 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 ( $T_C=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	80
		$T_C=100^\circ C$	51
Pulsed Drain Current (Note 1)	$I_{DM}$	320	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	88	mJ
Single Pulse Avalanche Current (Note 2)	$I_{AS}$	42	A
Total Power Dissipation	$P_D$	@ $T_C=25^\circ C$	54
		Derate above $T_C=25^\circ C$	0.43
Operating Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	2.3	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ C/W$

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

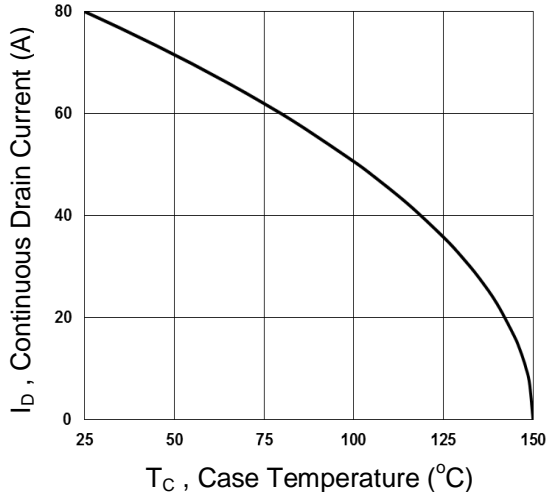
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 20A$	$R_{DS(ON)}$	--	4.8	6	m $\Omega$
	$V_{GS} = 4.5V, I_D = 10A$		--	6.5	9	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.6	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
	$V_{DS} = 24V, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Forward Transconductance	$V_{DS} = 10V, I_D = 10A$	$g_{fs}$	--	18	--	S
<b>Dynamic</b>						
Total Gate Charge <sup>(Note 3,4)</sup>	$V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 4.5V$	$Q_g$	--	11.1	--	nC
Gate-Source Charge <sup>(Note 3,4)</sup>		$Q_{GS}$	--	1.85	--	
Gate-Drain Charge <sup>(Note 3,4)</sup>		$Q_{gd}$	--	6.8	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1\text{MHz}$	$C_{iss}$	--	1160	--	pF
Output Capacitance		$C_{oss}$	--	200	--	
Reverse Transfer Capacitance		$C_{rss}$	--	180	--	
Gate Resistance	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	$R_g$	--	2.5	--	$\Omega$
<b>Switching</b>						
Turn-On Delay Time <sup>(Note 3,4)</sup>	$V_{DD}=15V, V_{GS}=10V,$ $R_G=3.3\Omega, I_D=-15A$	$t_{d(on)}$	--	7.5	--	ns
Turn-On Rise Time <sup>(Note 3,4)</sup>		$t_r$	--	14.5	--	
Turn-Off Delay Time <sup>(Note 3,4)</sup>		$t_{d(off)}$	--	35.2	--	
Turn-Off Fall Time <sup>(Note 3,4)</sup>		$t_f$	--	9.6	--	
<b>Source-Drain Diode Ratings and Characteristic</b>						
Continuous Drain-Source Diode	$V_G=V_D=0V, \text{ Force Current}$	$I_S$	--	--	80	A
Pulse Drain-Source Diode		$I_{SM}$	--	--	320	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = 1A$	$V_{SD}$	--	--	1	V

#### Note:

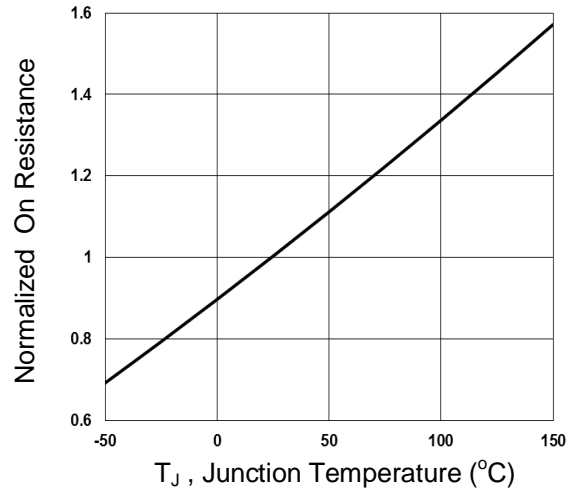
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=42A, R_G=25\Omega, \text{ Starting } T_J=25^\circ\text{C}$
3. The data tested by pulsed , pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
4. Essentially independent of operating temperature.

### Electrical Characteristics Curve

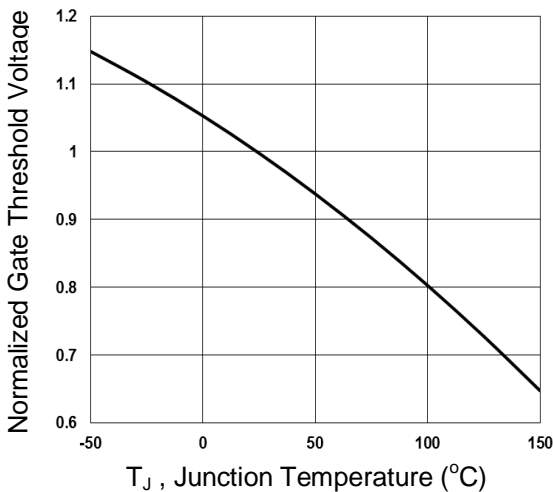
**Continuous Drain Current vs. T<sub>C</sub>**



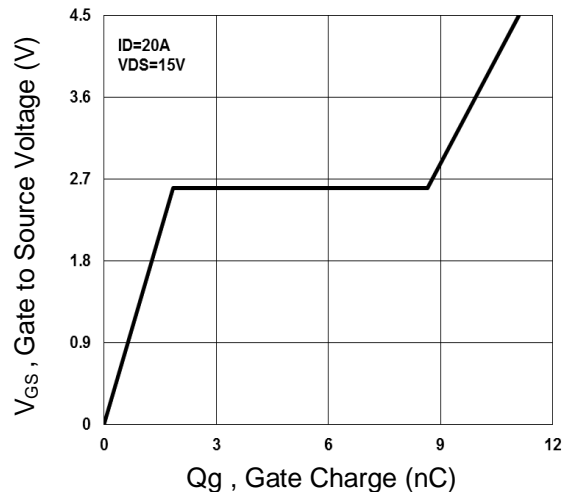
**Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



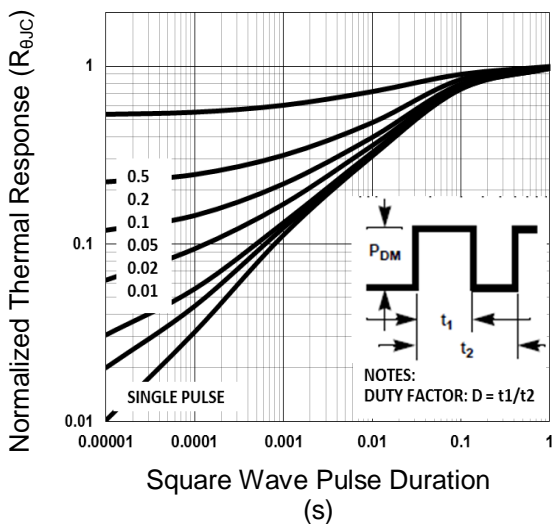
**Normalized V<sub>th</sub> vs. T<sub>J</sub>**



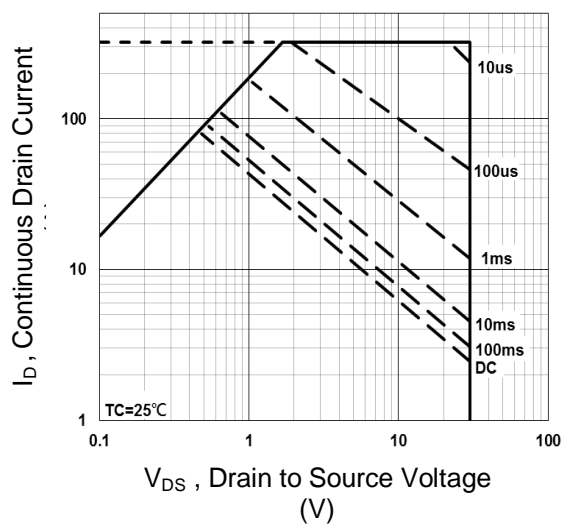
**Gate Charge Waveform**



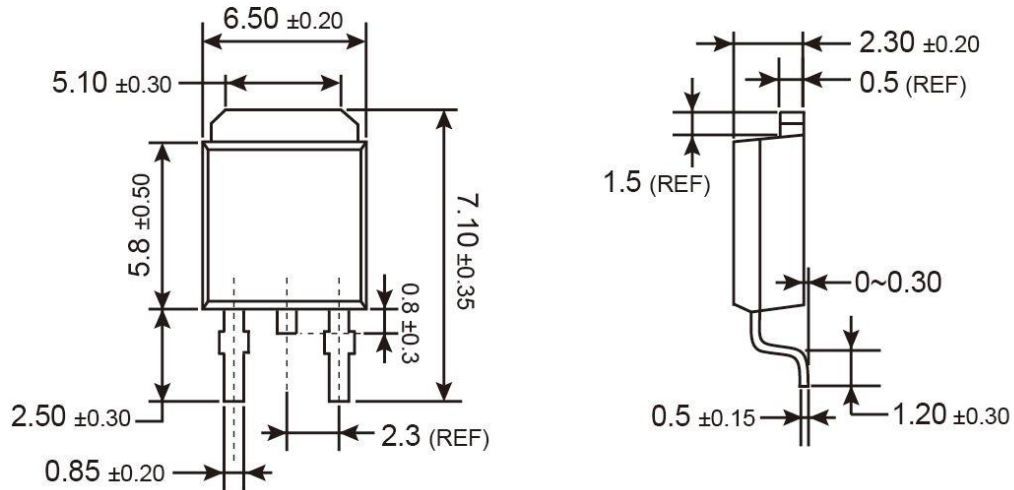
**Normalized Transient Impedance**



**Maximum Safe Operation Area**

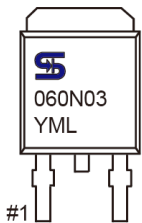


### TO-252 Mechanical Drawing



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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