

TSM040N03CP

30V N-Channel Power MOSFET



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

Key Parameter Performance

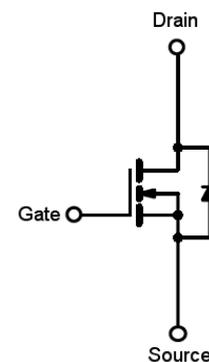
Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	4
	$V_{GS} = 4.5V$	6
Q_g	24	nC

Ordering Information

Ordering code	Package	Packing
TSM040N03CP ROG	TO-252	2.5kpcs / 13" Reel

Note: Halogen-free according to IEC 61249-2-21 definition

Block Diagram



N-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ\text{C}$	90
		$T_C=100^\circ\text{C}$	57
Pulsed Drain Current ^(Note 1)	I_{DM}	360	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	125	mJ
Single Pulse Avalanche Current ^(Note 2)	I_{AS}	50	A
Total Power Dissipation	P_D	@ $T_C=25^\circ\text{C}$	88
		Derate above $T_C=25^\circ\text{C}$	0.59
Operating Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1.7	$^\circ\text{C/W}$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ\text{C/W}$

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

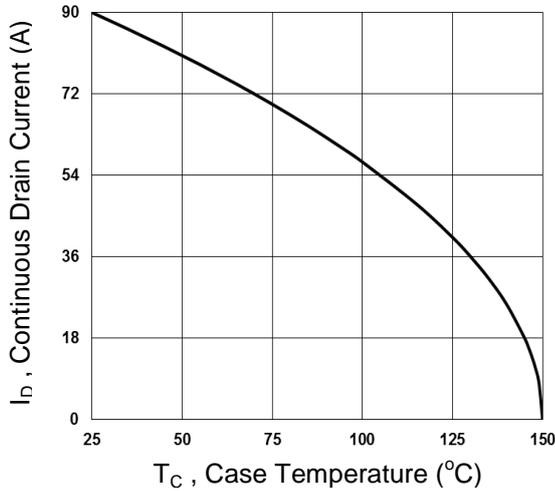
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 24A$	$R_{DS(ON)}$	--	3.1	4	m Ω
	$V_{GS} = 4.5V, I_D = 12A$		--	4.5	6	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.2	1.6	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	I_{DSS}	--	--	1	μA
	$V_{DS} = 24V, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Forward Transconductance	$V_{DS} = 10V, I_D = 10A$	g_{fs}	--	15.5	--	S
Dynamic						
Total Gate Charge (Note 3,4)	$V_{DS} = 15V, I_D = 24A,$ $V_{GS} = 4.5V$	Q_g	--	24	--	nC
Gate-Source Charge (Note 3,4)		Q_{gs}	--	4.2	--	
Gate-Drain Charge (Note 3,4)		Q_{gd}	--	13	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1\text{MHz}$	C_{iss}	--	2200	--	pF
Output Capacitance		C_{oss}	--	280	--	
Reverse Transfer Capacitance		C_{rss}	--	177	--	
Gate Resistance	$f = 1\text{MHz}$	R_g	--	2	--	Ω
Switching						
Turn-On Delay Time (Note 3,4)	$V_{DD}=15V, V_{GS}=10V,$ $R_G=3.3\Omega, I_D=-15A$	$t_{d(on)}$	--	12.6	--	ns
Turn-On Rise Time (Note 3,4)		t_r	--	19.5	--	
Turn-Off Delay Time (Note 3,4)		$t_{d(off)}$	--	42.8	--	
Turn-Off Fall Time (Note 3,4)		t_f	--	13.2	--	
Source-Drain Diode Ratings and Characteristic						
Continuous Drain-Source Diode		I_S	--	--	90	A
Pulse Drain-Source Diode		I_{SM}	--	--	360	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = 1A$	V_{SD}	--	--	1	V

Note:

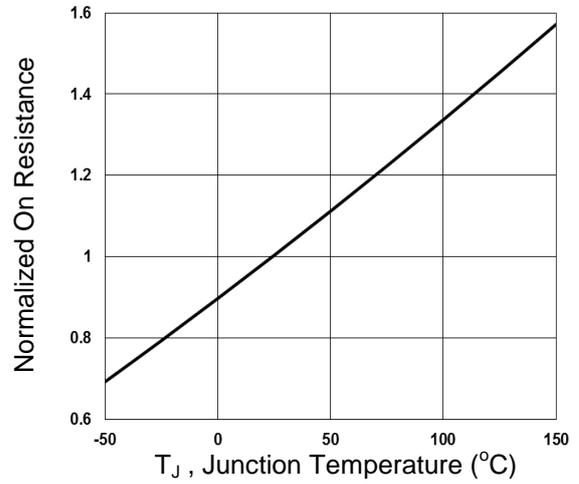
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Essentially independent of operating temperature.

Electrical Characteristics Curves

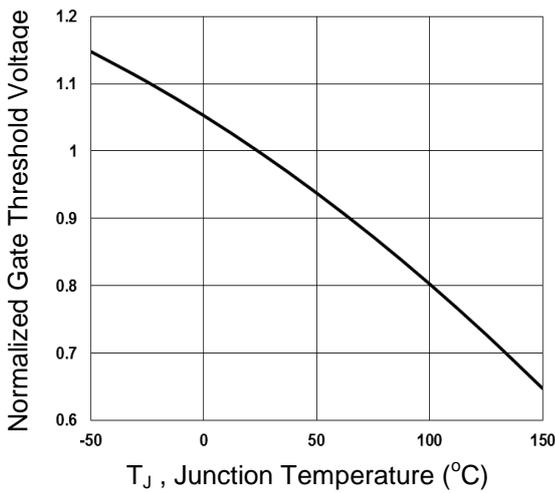
Continuous Drain Current vs. Tc



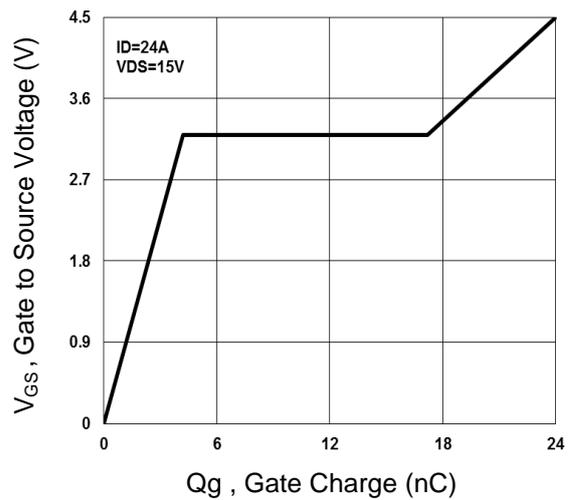
Normalized RDSON vs. Tj



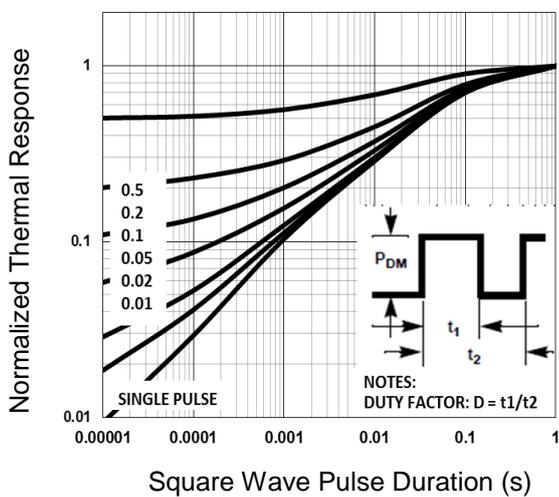
Normalized Vth vs. Tj



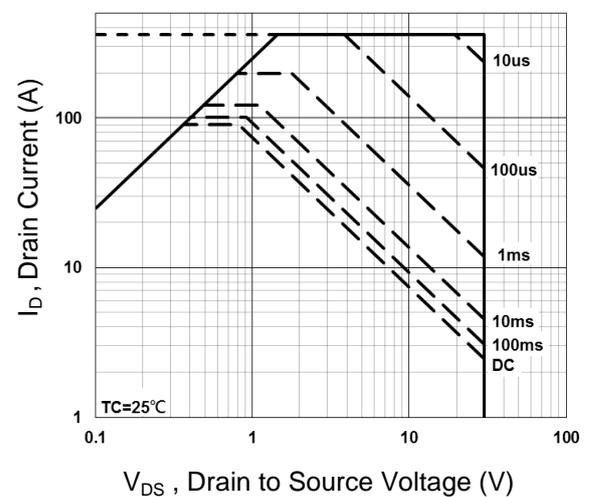
Gate Charge Waveform



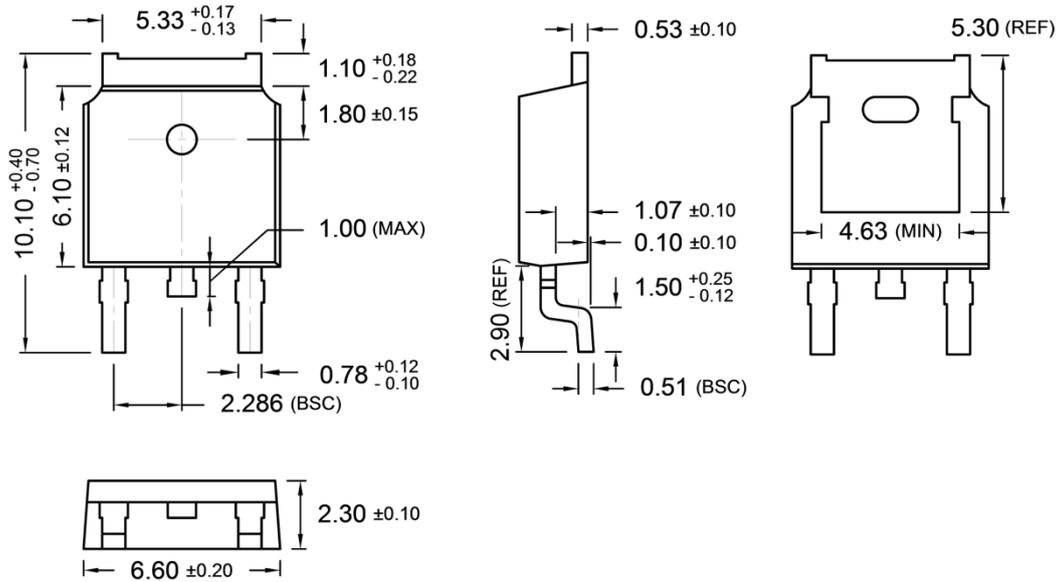
Normalized Transient Impedance



Maximum Safe Operation Area

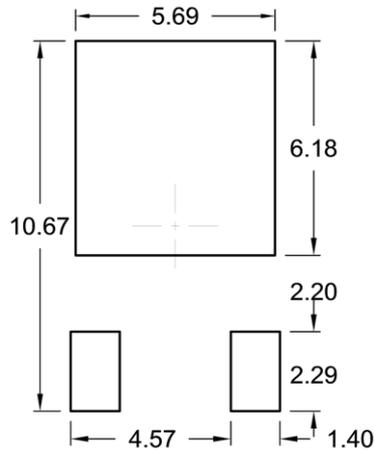


TO-252 Mechanical Drawing



Unit: Millimeters

SUGGESTED PAD LAYOUT (Unit: Millimeters)



Marking Diagram



- Y** = Year Code
- M** = Month Code
- 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 (1~9, A~Z)

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