

TSM040N03CP

30V N-Channel Power MOSFET



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

Key Parameter Performance

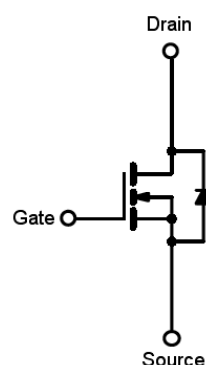
Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	4
	$V_{GS} = 4.5V$	6
Q_g	24	nC

Ordering Information

Part No.	Package	Packing
TSM040N03CP 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}	± 20	V
Continuous Drain Current	I_D	$T_C=25^\circ C$	90
		$T_C=100^\circ C$	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	@ $T_C=25^\circ C$	88
		Derate above $T_C=25^\circ C$	0.59
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	$R_{\theta JC}$	1.7	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ C/W$

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

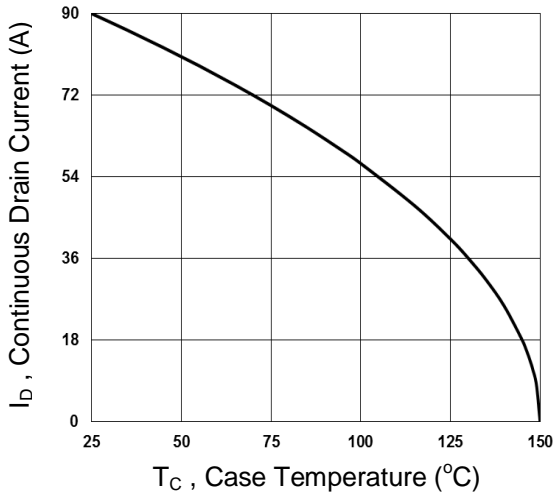
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 24A$	$R_{DS(ON)}$	--	3.1	4	m Ω
	$V_{GS} = 4.5V, I_D = 12A$		--	4.5	6	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	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	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	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	$V_G=V_D=0V$	I_S	--	--	90	A
Pulse Drain-Source Diode	Force Current	I_{SM}	--	--	360	A
Diode-Source Forward Voltage	$V_{GS} = 0V, I_S = 1A$	V_{SD}	--	--	1	V

Note:

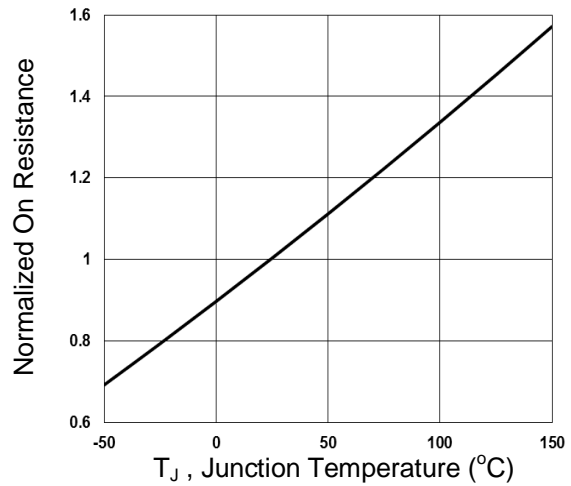
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega,$ Starting $T_J=25^\circ\text{C}$
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Essentially independent of operating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

Electrical Characteristics Curves

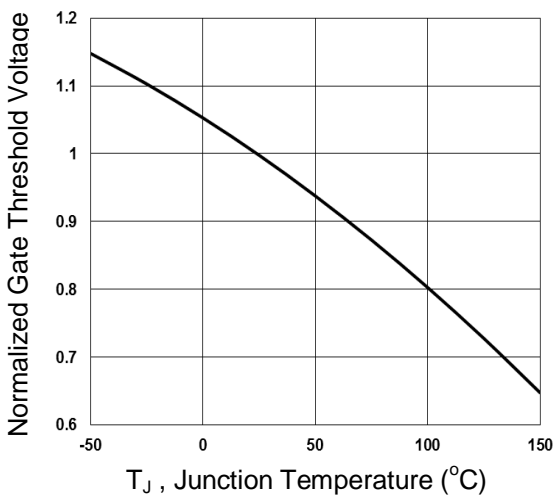
Continuous Drain Current vs. T_c



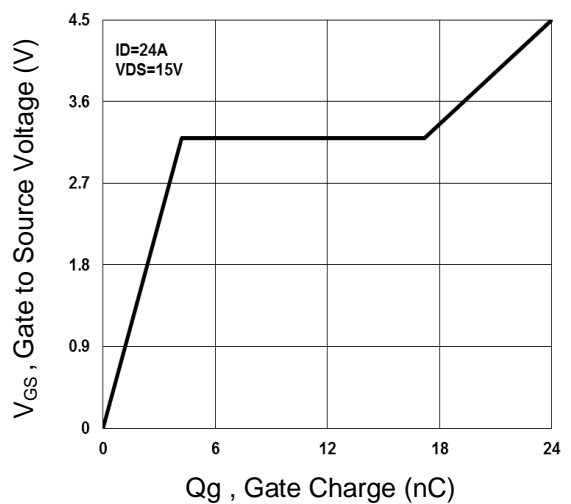
Normalized R_{DS(on)} vs. T_J



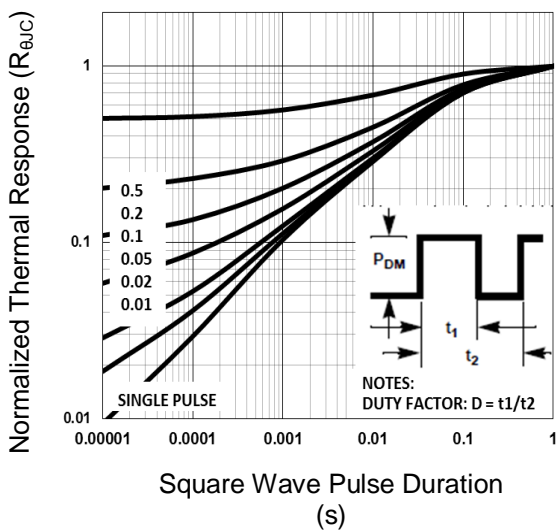
Normalized V_{th} vs. T_J



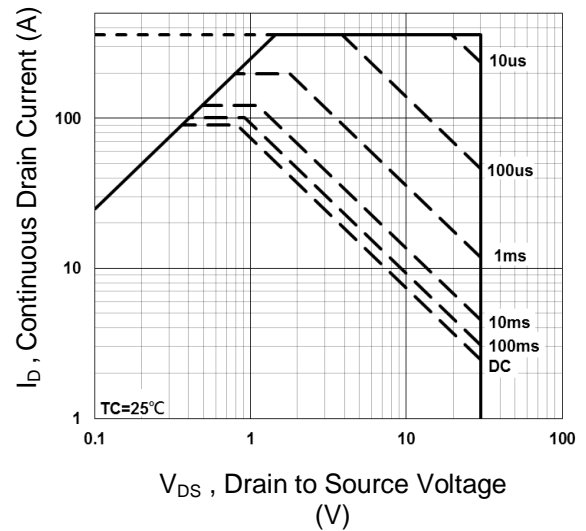
Gate Charge Waveform



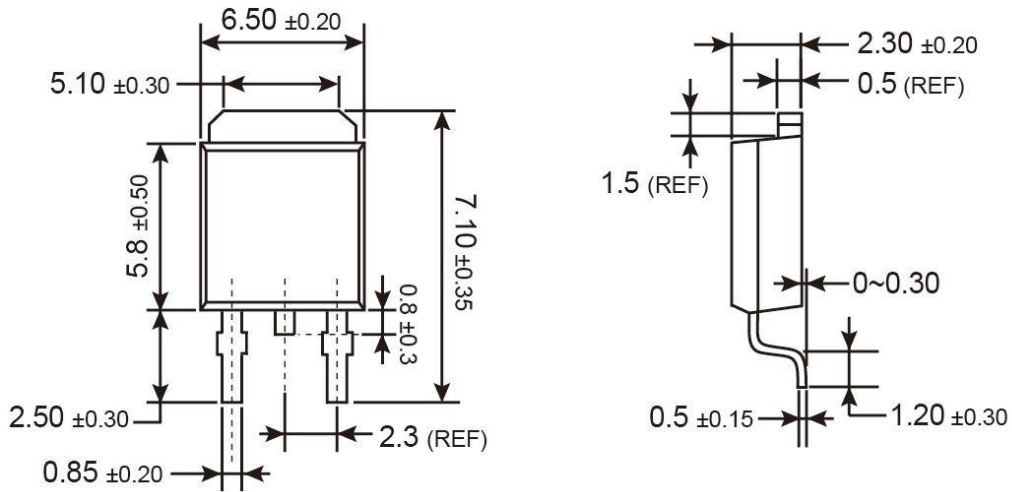
Normalized Transient Impedance



Maximum Safe Operation Area

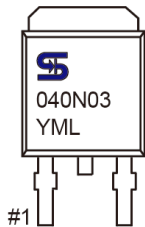


TO-252 Mechanical Drawing



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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