

TSM040N03CP

30V N-Channel Power MOSFET



Pin Definition:

1. Gate
2. Drain
3. Source

Key Parameter Performance

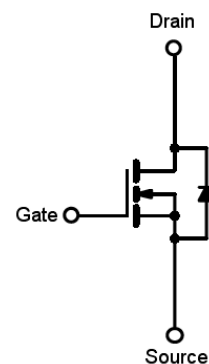
Parameter		Value	Unit
V_{DS}		30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	4	m Ω
	$V_{GS} = 4.5V$	6	
Q_g		24	nC

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

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	90	A
	$T_C=100^\circ\text{C}$		57	A
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	@ $T_C=25^\circ\text{C}$	P_D	88	W
	Derate above $T_C=25^\circ\text{C}$		0.59	W/ $^\circ\text{C}$
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)

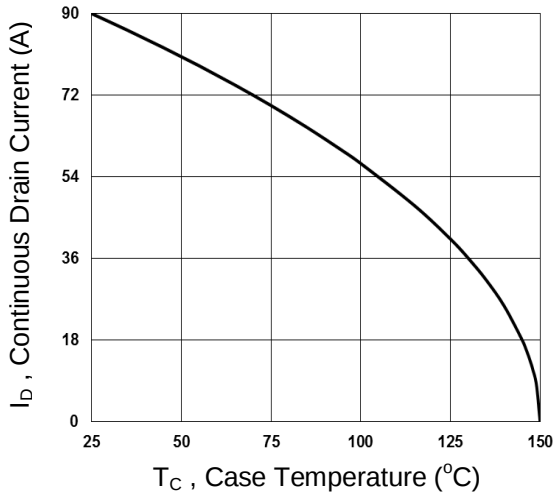
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	30	--	--	V
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 24A	R _{DS(ON)}	--	3.1	4	mΩ
	V _{GS} = 4.5V, I _D = 12A		--	4.5	6	
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	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°C		--	--	10	
Gate Body Leakage	V _{GS} = ±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 = 1MHz	C _{iss}	--	2200	--	pF
Output Capacitance		C _{oss}	--	280	--	
Reverse Transfer Capacitance		C _{rss}	--	177	--	
Gate Resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz	R _g	--	2	--	Ω
Switching						
Turn-On Delay Time ^(Note 3,4)	V _{DD} =15V , V _{GS} =10V , R _G =3.3Ω, 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 Force Current	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:

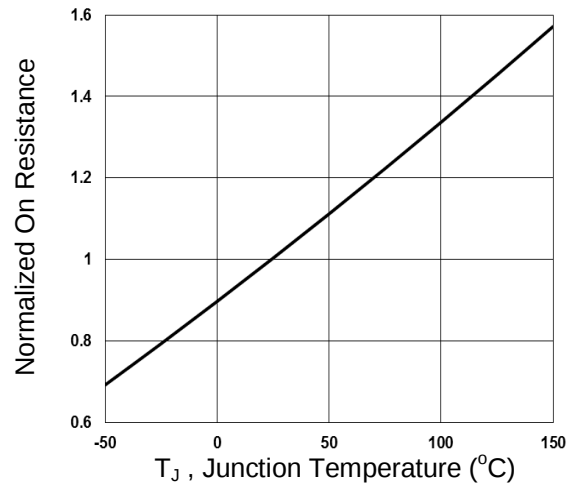
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=50A, R_G=25\Omega$, Starting $T_J=25^{\circ}\text{C}$
3. The data tested by pulsed, pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
4. Essentially independent of operating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

Electrical Characteristics Curves

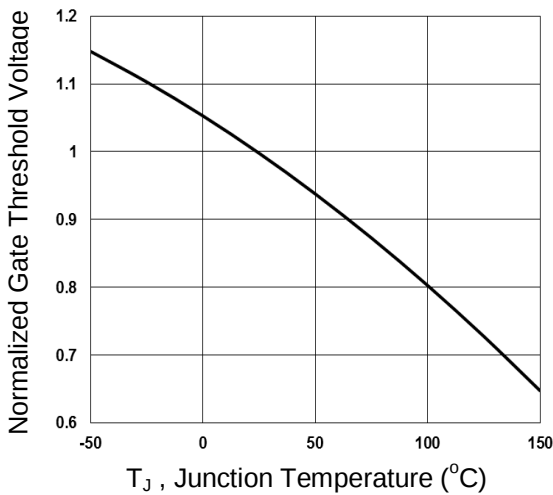
Continuous Drain Current vs. T_C



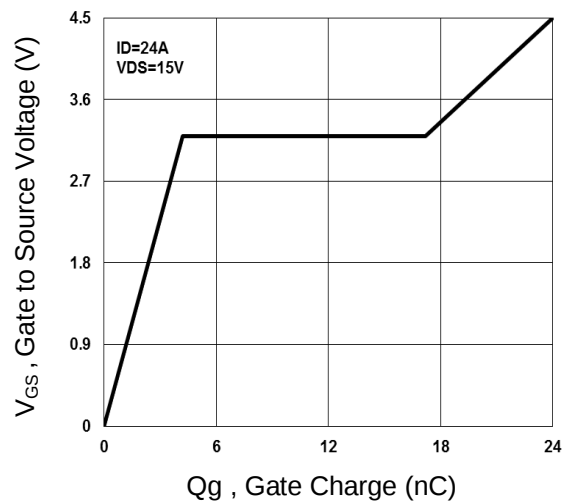
Normalized $R_{DS(on)}$ vs. T_J



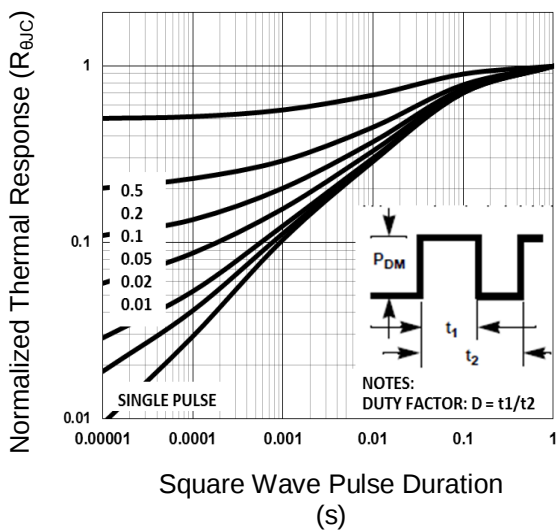
Normalized V_{th} vs. T_J



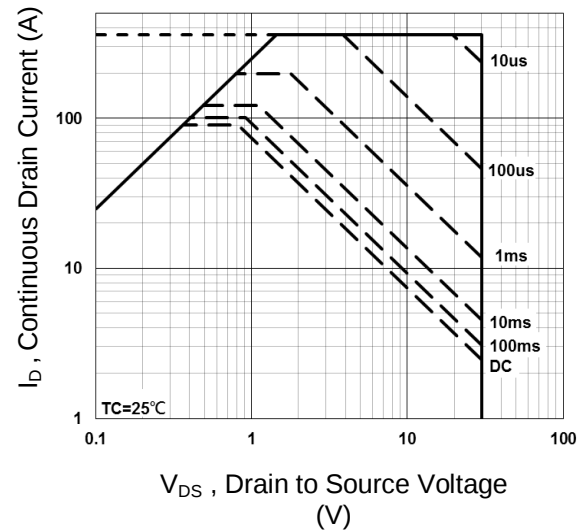
Gate Charge Waveform



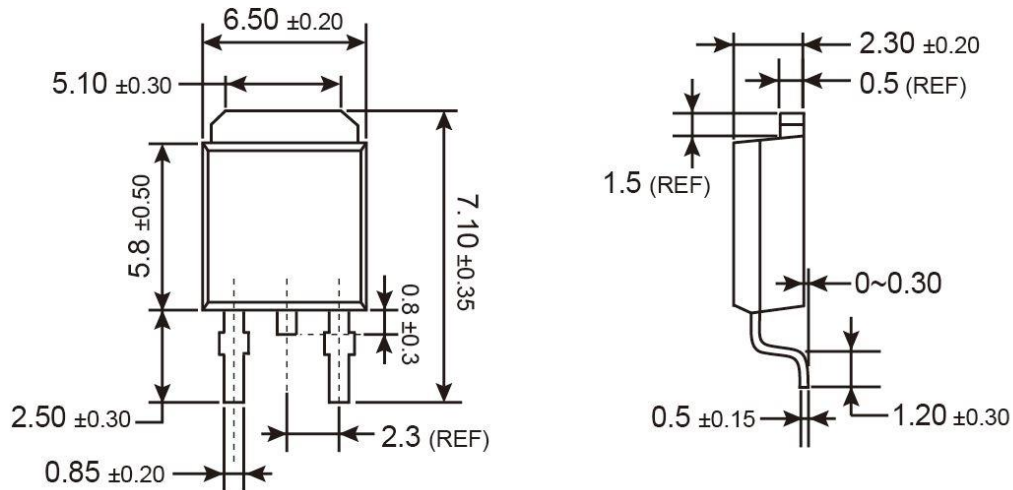
Normalized Transient Impedance



Maximum Safe Operation Area

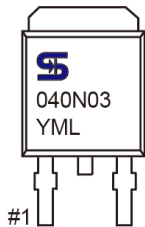


TO-252 Mechanical Drawing



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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