

TSM240N03CX

30V N-Channel Power MOSFET

SOT-23



Pin Definition:

1. Gate
2. Source
3. Drain

Note:

MSL 1 (Moisture Sensitivity Level) per J-STD-020

Key Parameter Performance

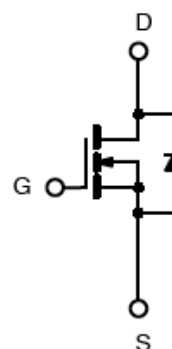
Parameter	Value	Unit
V_{DS}	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	24
	$V_{GS} = 4.5V$	34
Q_g	4.1	nC

Ordering Information

Ordering code	Package	Packing
TSM240N03CX RFG	SOT-23	3kpcs / 7" 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	$T_C = 25^\circ\text{C}$	6.5
		$T_C = 100^\circ\text{C}$	4.1
Pulsed Drain Current ^(Note 1)	I_{DM}	26	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	32	mJ
Power Dissipation @ $T_C = 25^\circ\text{C}$	P_D	1.56	W
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 Ambient	$R_{\theta JA}$	80	$^\circ\text{C/W}$

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

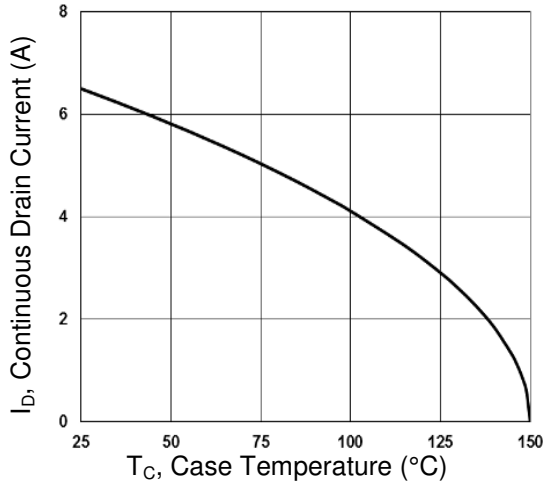
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10\text{V}, I_D = 6\text{A}$	$R_{DS(on)}$	--	17	24	m Ω
	$V_{GS} = 4.5\text{V}, I_D = 4\text{A}$		--	22	34	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	1.2	1.4	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}$	I_{DSS}	--	--	1	μA
	$V_{DS} = 24\text{V}, T_J = 125^\circ\text{C}$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	μA
Forward Transconductance ^(Note 3)	$V_{DS} = 10\text{V}, I_D = 4\text{A}$	g_{fs}	--	6.5	--	S
Dynamic						
Total Gate Charge ^(Note 3,4)	$V_{DS} = 15\text{V}, I_D = 6\text{A},$ $V_{GS} = 4.5\text{V}$	Q_g	--	4.1	--	nC
Gate-Source Charge ^(Note 3,4)		Q_{gs}	--	1	--	
Gate-Drain Charge ^(Note 3,4)		Q_{gd}	--	2.1	--	
Input Capacitance	$V_{DS} = 25\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	C_{iss}	--	345	--	pF
Output Capacitance		C_{oss}	--	55	--	
Reverse Transfer Capacitance		C_{rss}	--	32	--	
Switching						
Turn-On Delay Time ^(Note 3,4)	$V_{DD} = 15\text{V}, I_D = 1\text{A},$ $V_{GS} = 10\text{V}, R_G = 6\Omega$	$t_{d(on)}$	--	2.8	--	ns
Turn-On Rise Time ^(Note 3,4)		t_r	--	7.2	--	
Turn-Off Delay Time ^(Note 3,4)		$t_{d(off)}$	--	15.8	--	
Turn-Off Fall Time ^(Note 3,4)		t_f	--	4.6	--	
Source-Drain Diode Ratings and Characteristic						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I_S	--	--	6.5	A
Maximum Pulse Drain-Source Diode Forward Current		I_{SM}	--	--	26	A
Diode-Source Forward Voltage	$V_{GS} = 0\text{V}, I_S = 1\text{A}$	V_{SD}	--	--	1	V

Note:

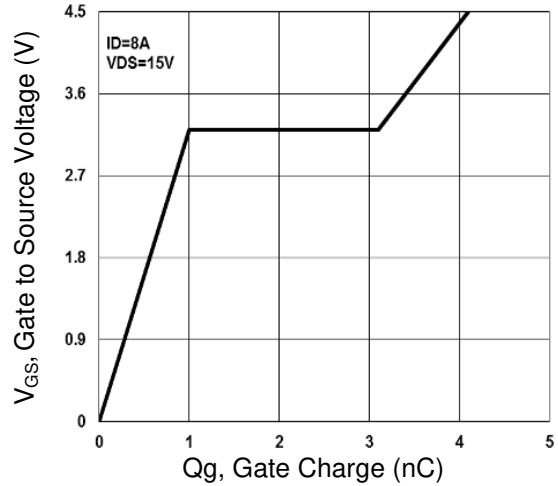
- Pulse width limited by safe operating area
- $L = 1\text{mH}, I_{AS} = 8\text{A}, V_{DD} = 25\text{V}, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$
- Switching time is essentially independent of operating temperature.

Electrical Characteristics Curve

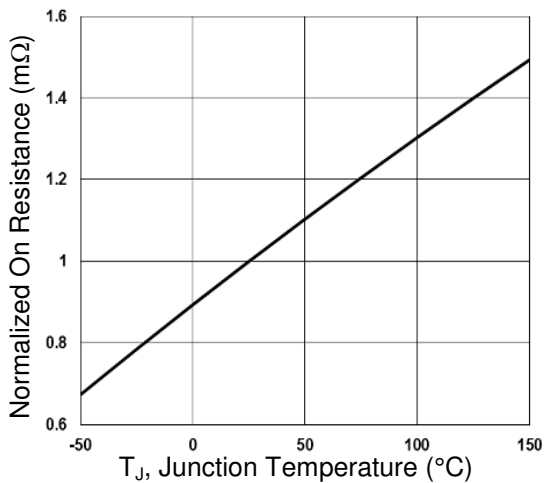
Continuous Drain Current vs. T_C



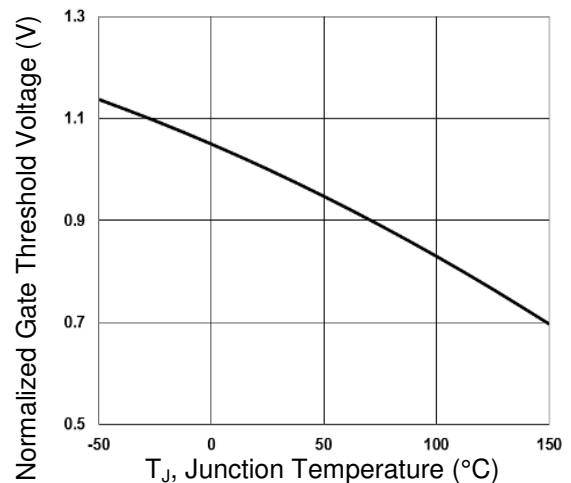
Gate Charge



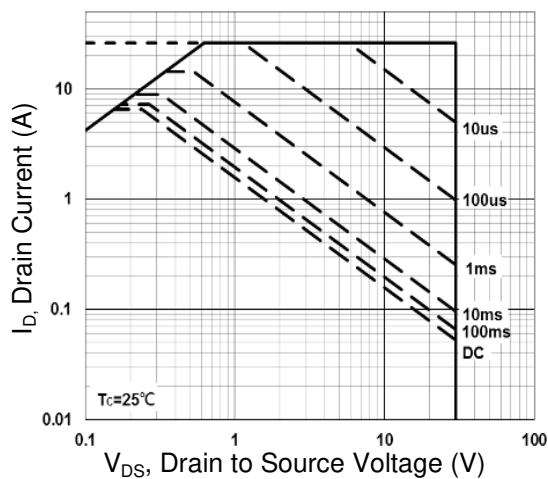
On-Resistance vs. Junction Temperature



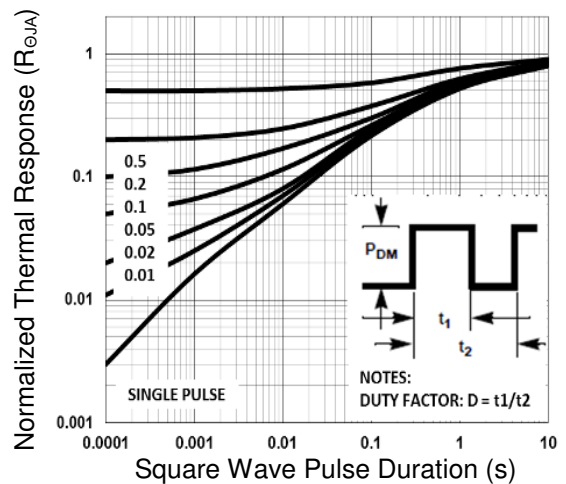
Threshold Voltage vs. Junction Temperature



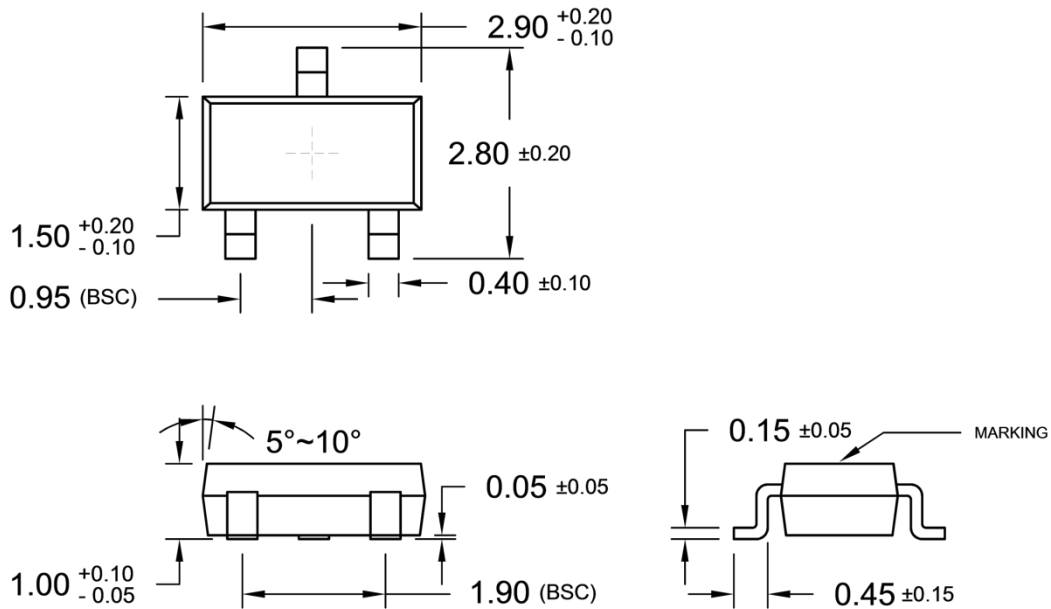
Maximum Safe Operating Area



Normalized Thermal Transient Impedance Curve

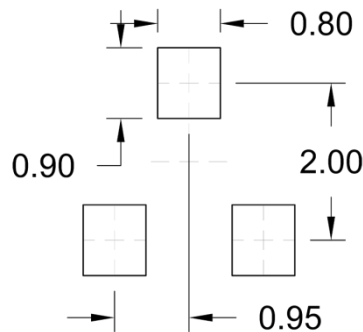


SOT-23 Mechanical Drawing

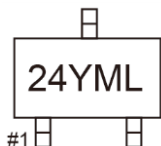


Unit: Millimeters

SUGGESTED PAD LAYOUT (Unit: Millimeters)



Marking Diagram



- 24** = Device Code
- 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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