TSM250N02CX

20V 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

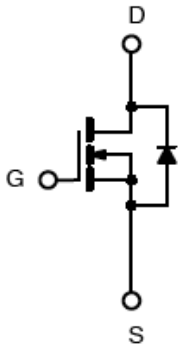
Parameter		Value	Unit
V_{DS}		20	V
$R_{DS(on)}$ (max)	V_{GS} = 4.5V	25	mΩ
	V_{GS} = 2.5V	35	
	V_{GS} = 1.8V	55	
Q_g		7.7	nC

Ordering Information

Ordering code	Package	Packing
TSM250N02CX 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°C unless otherwise noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±10	V
Continuous Drain Current	T_C = 25°C	I_D	5.8	A
	T_C = 100°C		3.7	A
Pulsed Drain Current (Note 1)		I_{DM}	23.2	A
Power Dissipation @ T_C = 25°C		P_D	1.56	W
Operating Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{STG}	-55 to +150	°C

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Ambient	$R_{\Theta JA}$	80	°C/W

Pb-Free RoHS COMPLIANT

Electrical Specifications (T_C = 25°C unless otherwise noted)

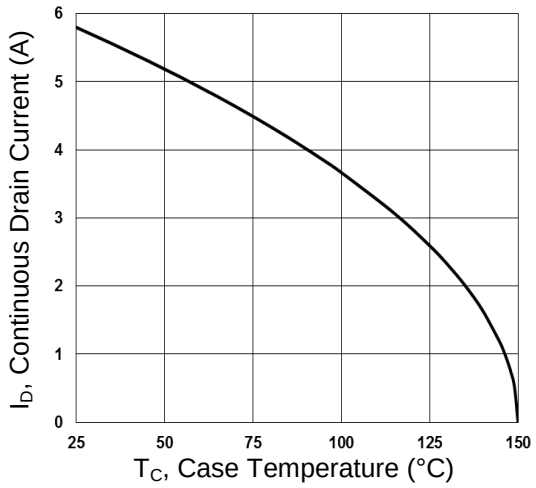
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V_{GS} = 0V, I_D = 250μA	BV_{DSS}	20	--	--	V
Drain-Source On-State Resistance	V_{GS} = 4.5V, I_D = 4A	$R_{DS(on)}$	--	20	25	mΩ
	V_{GS} = 2.5V, I_D = 3A		--	27	35	
	V_{GS} = 1.8V, I_D = 2A		--	39	55	
Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	$V_{GS(TH)}$	0.4	0.6	0.8	V
Zero Gate Voltage Drain Current	V_{DS} = 16V, V_{GS} = 0V	I_{DSS}	--	--	1	μA
	V_{DS} = 16V, T_J = 85°C		--	--	10	
Gate Body Leakage	V_{GS} = ±10V, V_{DS} = 0V	I_{GSS}	--	--	±100	nA
Forward Transconductance (Note 2)	V_{DS} = 10V, I_S = 3A	g_{fs}	--	6.5	--	S
Dynamic						
Total Gate Charge (Note 2,3)	V_{DS} = 10V, I_D = 4A, V_{GS} = 4.5V	Q_g	--	7.7	--	nC
Gate-Source Charge (Note 2,3)		Q_{gs}	--	0.9	--	
Gate-Drain Charge (Note 2,3)		Q_{gd}	--	2.4	--	
Input Capacitance	V_{DS} = 10V, V_{GS} = 0V, f = 1.0MHz	C_{iss}	--	535	--	pF
Output Capacitance		C_{oss}	--	60	--	
Reverse Transfer Capacitance		C_{rss}	--	34	--	
Switching						
Turn-On Delay Time (Note 2,3)	V_{DD} = 10V, I_D = 1A, V_{GS} = 4.5V, R_G = 25Ω	$t_{d(on)}$	--	4.1	--	ns
Turn-On Rise Time (Note 2,3)		t_r	--	11.6	--	
Turn-Off Delay Time (Note 2,3)		$t_{d(off)}$	--	23.9	--	
Turn-Off Fall Time (Note 2,3)		t_f	--	7.6	--	
Source-Drain Diode Ratings and Characteristic						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I_S	--	--	5.8	A
Maximum Pulse Drain-Source Diode Forward Current		I_{SM}	--	--	23.2	A
Diode-Source Forward Voltage	V_{GS} = 0V, I_S = 1A	V_{SD}	--	--	1	V

Note:

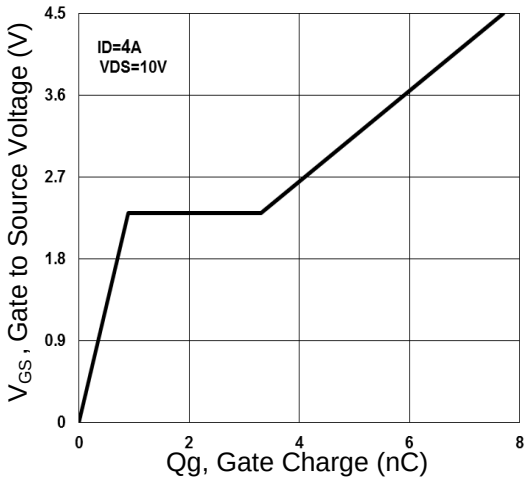
1. Pulse width limited by safe operating area
2. Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%
3. Switching time is essentially independent of operating temperature.

Electrical Characteristics Curve

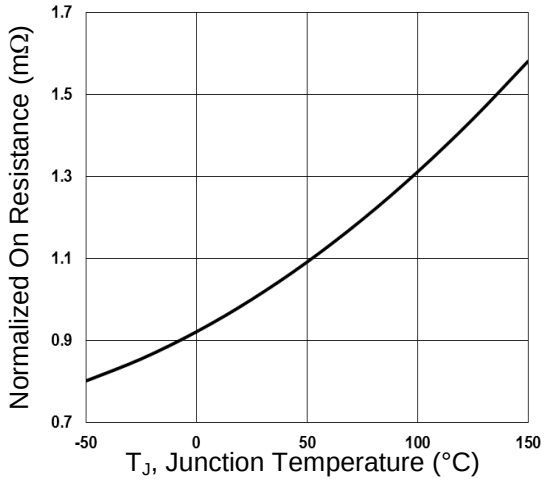
Continuous Drain Current vs. T_C



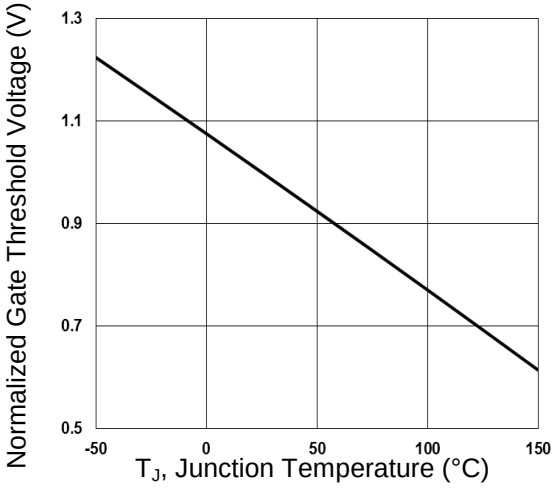
Gate Charge



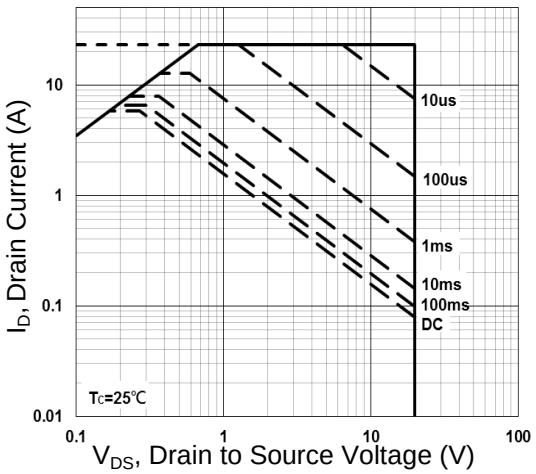
On-Resistance vs. Junction Temperature



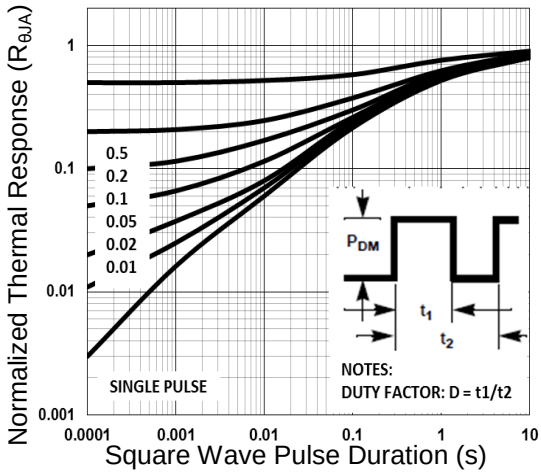
Threshold Voltage vs. Junction Temperature



Maximum Safe Operating Area



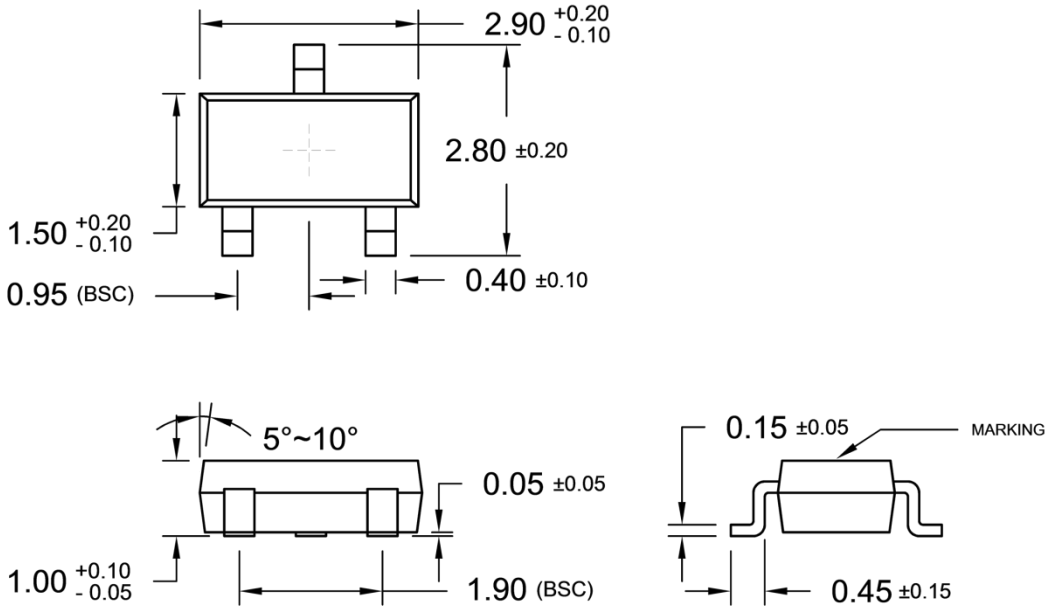
Normalized Thermal Transient Impedance Curve



TSM250N02CX

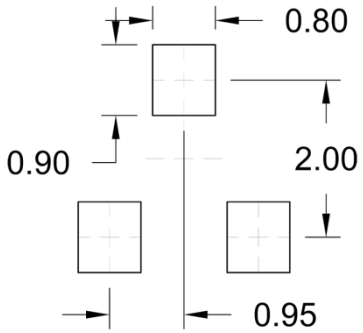
20V N-Channel Power MOSFET

SOT-23 Mechanical Drawing

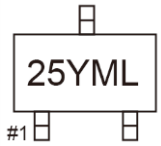


Unit: Millimeters

SUGGESTED PAD LAYOUT (Unit: Millimeters)



Marking Diagram



25 = Device Code
Y = Year Code
M = Month Code for Halogen Free Product
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apl, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
L = Lot Code

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