

# TSM250N02CX

## 20V N-Channel Power MOSFET

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

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	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	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	0.4	0.6	0.8	V
Zero Gate Voltage Drain Current	$V_{DS} = 16V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	μA
	$V_{DS} = 16V, T_J = 85^{\circ}C$		--	--	10	
Gate Body Leakage	$V_{GS} = \pm 10V, V_{DS} = 0V$	$I_{GSS}$	--	--	±100	nA
Forward Transconductance <sup>(Note 2)</sup>	$V_{DS} = 10V, I_S = 3A$	$g_{fs}$	--	6.5	--	S
Dynamic						
Total Gate Charge <sup>(Note 2,3)</sup>	$V_{DS} = 10V, I_D = 4A,$ $V_{GS} = 4.5V$	$Q_g$	--	7.7	--	nC
Gate-Source Charge <sup>(Note 2,3)</sup>		$Q_{gs}$	--	0.9	--	
Gate-Drain Charge <sup>(Note 2,3)</sup>		$Q_{gd}$	--	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 <sup>(Note 2,3)</sup>	$V_{DD} = 10V, I_D = 1A,$ $V_{GS} = 4.5V, R_G = 25\Omega$	$t_{d(on)}$	--	4.1	--	ns
Turn-On Rise Time <sup>(Note 2,3)</sup>		$t_r$	--	11.6	--	
Turn-Off Delay Time <sup>(Note 2,3)</sup>		$t_{d(off)}$	--	23.9	--	
Turn-Off Fall Time <sup>(Note 2,3)</sup>		$t_f$	--	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:

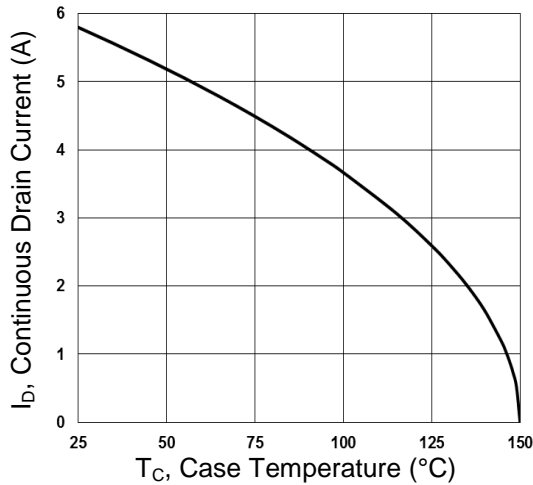
- Pulse width limited by safe operating area
- Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
- Switching time is essentially independent of operating temperature.

# TSM250N02CX

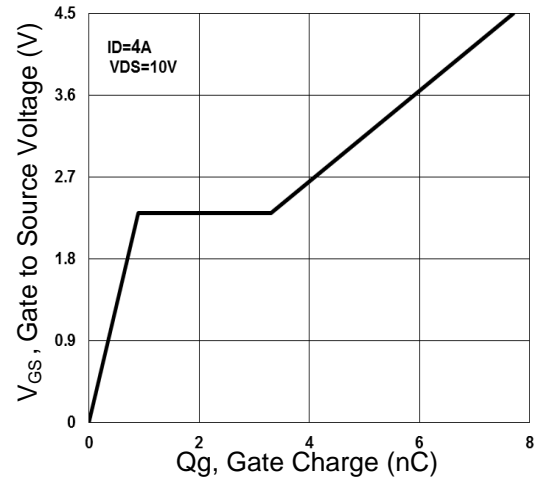
## 20V N-Channel Power MOSFET

### Electrical Characteristics Curve

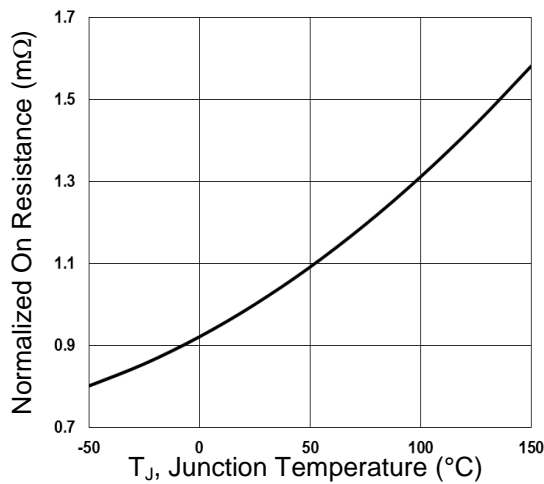
Continuous Drain Current vs.  $T_C$



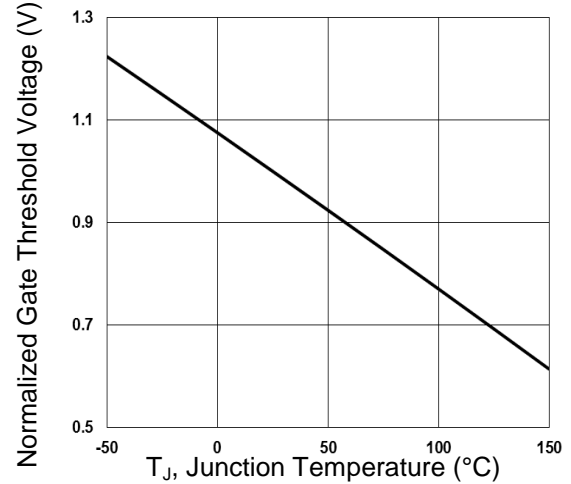
Gate Charge



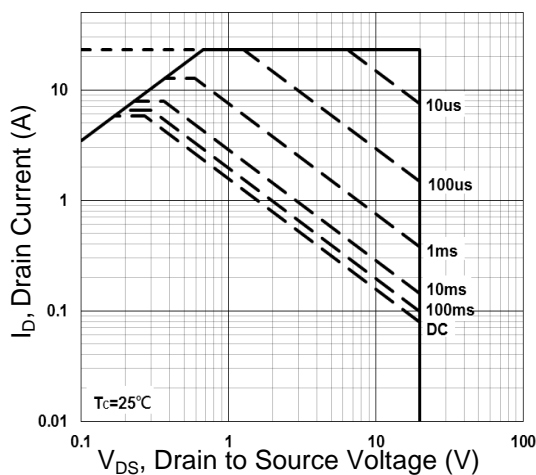
On-Resistance vs. Junction Temperature



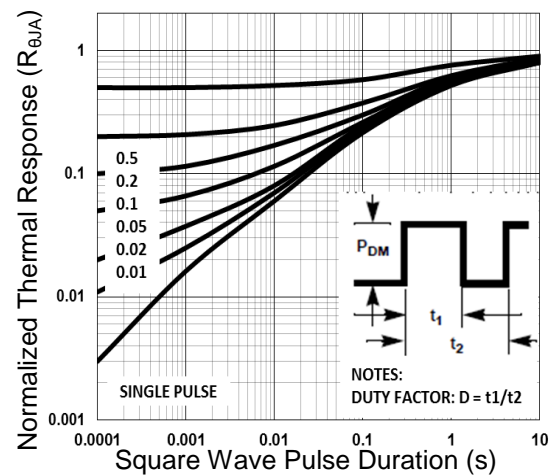
Threshold Voltage vs. Junction Temperature



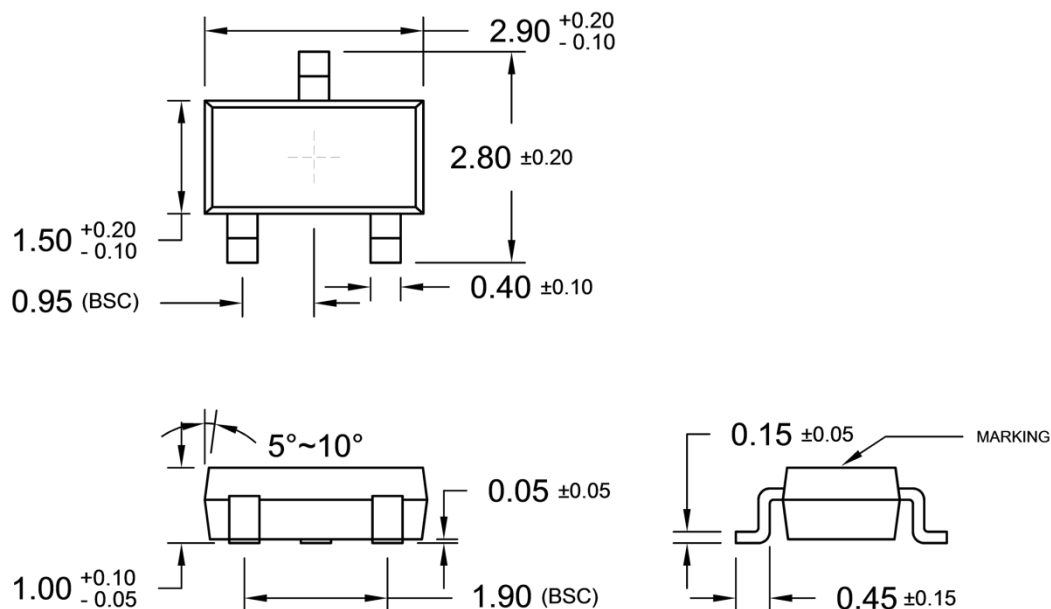
Maximum Safe Operating Area



Normalized Thermal Transient Impedance Curve

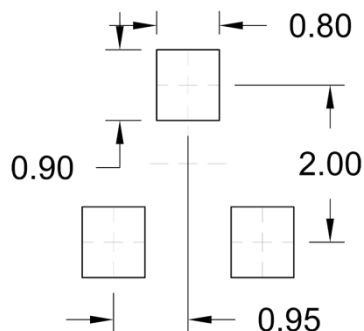


## SOT-23 Mechanical Drawing

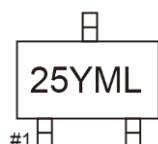


Unit: Millimeters

## **SUGGESTED PAD LAYOUT** (Unit: Millimeters)



## **Marking Diagram**



- 25** = 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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