



**THE DATASHEET OF  
TSM160N10CZ C0G**



## N-Channel Power MOSFET

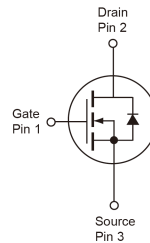
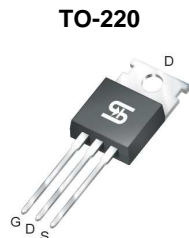
100V, 160A, 5.5mΩ

### FEATURES

- Advanced Trench Technology
- Low  $R_{DS(ON)}$  5.5mΩ (Max.)
- Low gate charge typical @ 154nC (Typ.)
- Low Crss typical @ 260pF (Typ.)

### KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
$V_{DS}$	100	V
$R_{DS(on)}$ (max)	5.5	mΩ
$Q_g$	154	nC



**Notes:** Moisture sensitivity level: level 3. Per J-STD-020

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>(Note 1)</sup>	$I_D$	$T_C = 25^\circ\text{C}$	160
		$T_C = 70^\circ\text{C}$	127
		$T_A = 25^\circ\text{C}$	14.2
		$T_A = 70^\circ\text{C}$	11.4
Pulsed Drain Current <sup>(Note 2)</sup>	$I_{DM}$	620	A
Total Power Dissipation	$P_{DTOT}$	$T_C = 25^\circ\text{C}$	300
		$T_C = 70^\circ\text{C}$	210
		$T_A = 25^\circ\text{C}$	2.4
		$T_A = 70^\circ\text{C}$	1.68
Single Pulsed Avalanche Energy <sup>(Note 3)</sup>	$E_{AS}, E_{AR}$	400	mJ
Single Pulsed Avalanche Current <sup>(Note 3)</sup>	$I_{AS}, I_{AR}$	40	A
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +175	$^\circ\text{C}$

<b>THERMAL PERFORMANCE</b>			
<b>PARAMETER</b>	<b>SYMBOL</b>	<b>LIMIT</b>	<b>UNIT</b>
Junction to Case Thermal Resistance	$R_{\theta JC}$	0.5	$^{\circ}\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62.5	$^{\circ}\text{C/W}$

**Notes:**  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins.  $R_{\theta JA}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 PCB in still air.

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^{\circ}\text{C}$ unless otherwise noted)						
<b>PARAMETER</b>	<b>CONDITIONS</b>	<b>SYMBOL</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>	<b>UNIT</b>
<b>Static</b> (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	$BV_{DSS}$	100	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 80\text{V}, V_{GS} = 0\text{V}$	$I_{DSS}$	--	--	1	$\mu\text{A}$
Gate Body Leakage	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	$I_{GSS}$	--	--	$\pm 100$	nA
Drain-Source On-State Resistance	$V_{GS} = 10\text{V}, I_D = 30\text{A}$	$R_{DS(on)}$	--	4.5	5.5	$\text{m}\Omega$
<b>Dynamic</b> (Note 5)						
Total Gate Charge	$V_{DS} = 30\text{V}, I_D = 30\text{A}, V_{GS} = 10\text{V}$	$Q_g$	--	154	--	nC
Gate-Source Charge		$Q_{gs}$	--	35	--	
Gate-Drain Charge		$Q_{gd}$	--	40	--	
Input Capacitance	$V_{DS} = 30\text{V}, V_{GS} = 0\text{V}, F = 1.0\text{MHz}$	$C_{iss}$	--	9840	--	pF
Output Capacitance		$C_{oss}$	--	750	--	
Reverse Transfer Capacitance		$C_{rss}$	--	260	--	
<b>Switching</b> (Note 6)						
Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 30\text{V}, R_G = 3.3\Omega$	$t_{d(on)}$	--	25	--	ns
Turn-On Rise Time		$t_r$	--	40	--	
Turn-Off Delay Time		$t_{d(off)}$	--	85	--	
Turn-Off Fall Time		$t_f$	--	45	--	
<b>Source-Drain Diode</b> (Note 4)						
Forward Voltage	$V_{GS}=0\text{V}, I_S=30\text{A}$	$V_{SD}$	-	0.8	1.3	V
Reverse Recovery Time	$I_S = 30\text{A}, T_J = 25^{\circ}\text{C}$ $di/dt = 100\text{A}/\mu\text{s}$	$t_{rr}$		120		nS
Reverse Recovery Charge		$Q_{rr}$		160		nC

**Notes:**

1. Current limited by package.
2. Pulse width limited by the maximum junction temperature.
3.  $L = 0.5\text{mH}, I_{AS} = 40\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$
4. Pulse test:  $PW \leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$ .
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

**ORDERING INFORMATION**

<b>PART NO.</b>	<b>PACKAGE</b>	<b>PACKING</b>
TSM160N10CZ C0G	TO-220	50pcs / Tube

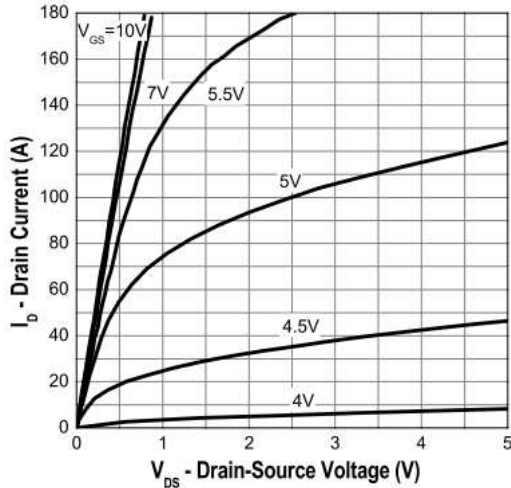
**Note:**

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

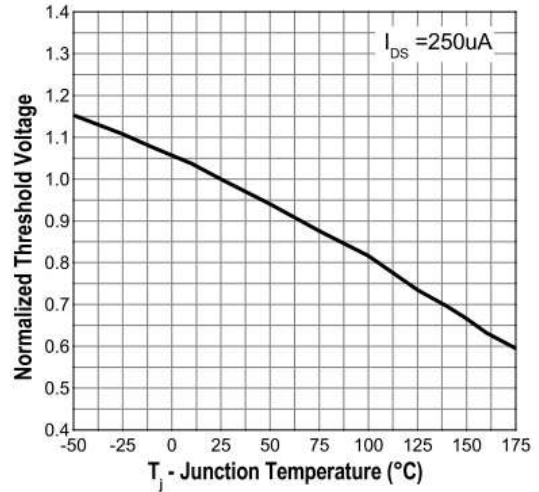
**CHARACTERISTICS CURVES**

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

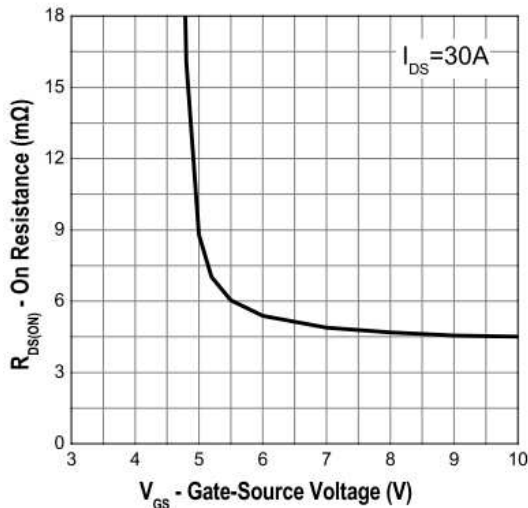
**Output Characteristics**



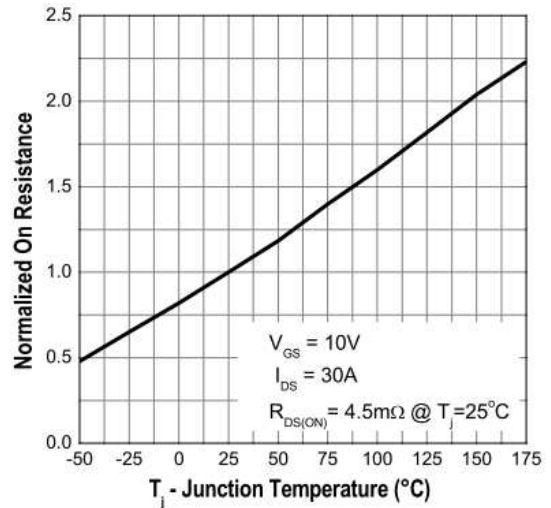
**Gate Threshold Voltage**



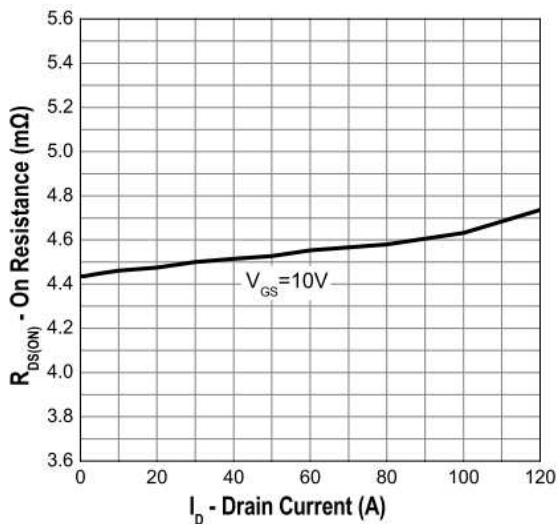
**Gate Source On Resistance**



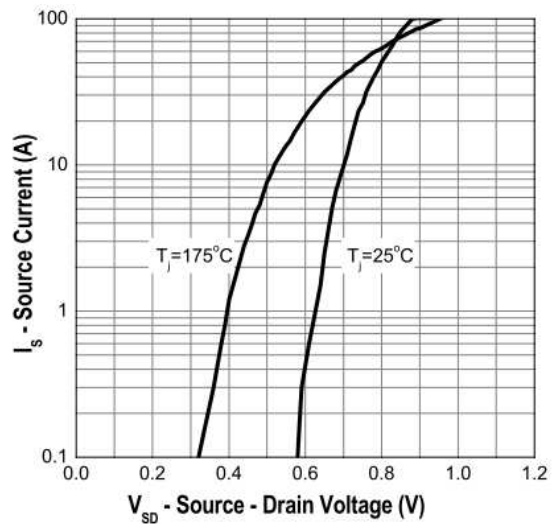
**Drain-Source On Resistance**



**Drain-Source On-Resistance**



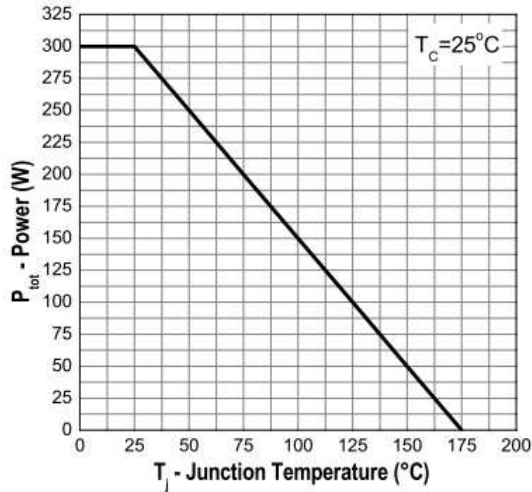
**Source-Drain Diode Forward Voltage**



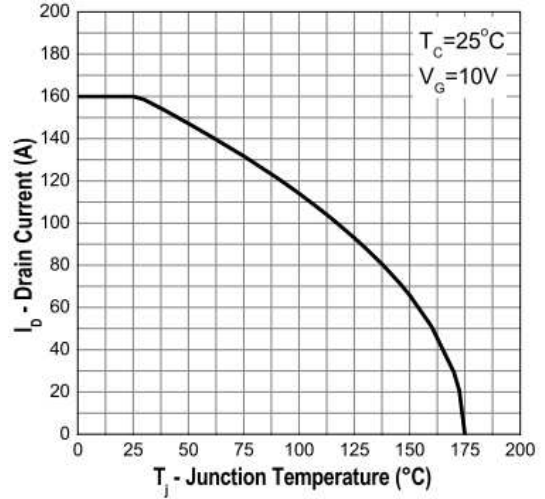
**CHARACTERISTICS CURVES**

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

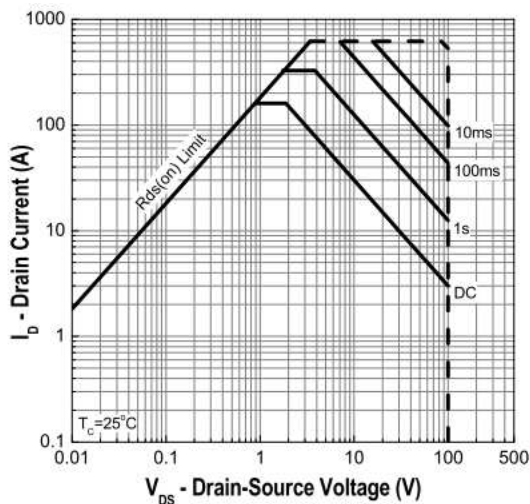
**Power Derating**



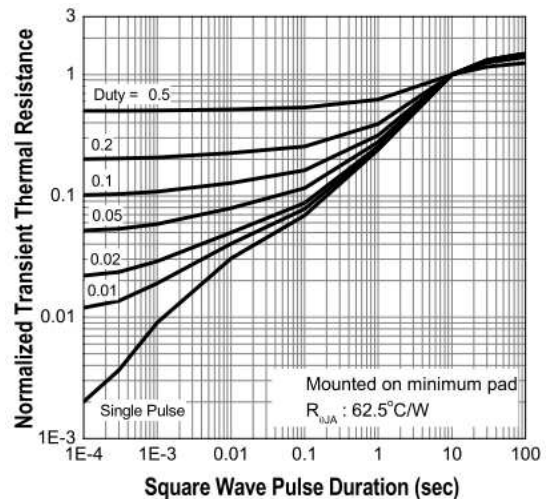
**Drain Current vs. Junction Temperature**



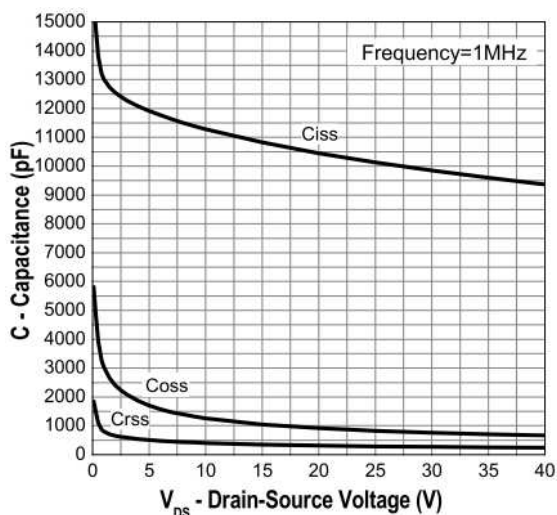
**Safe Operation Area**



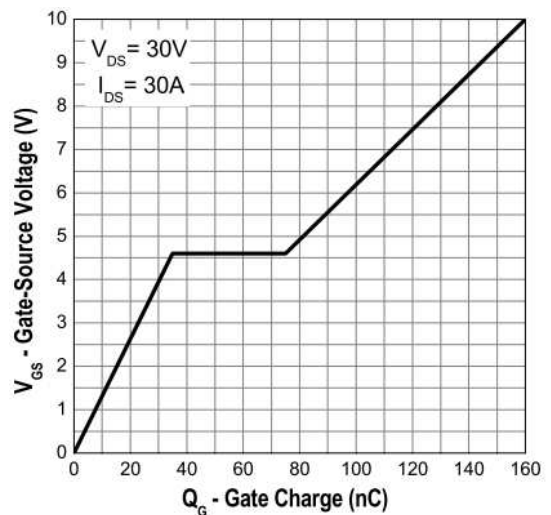
**Transient Thermal Impedance**



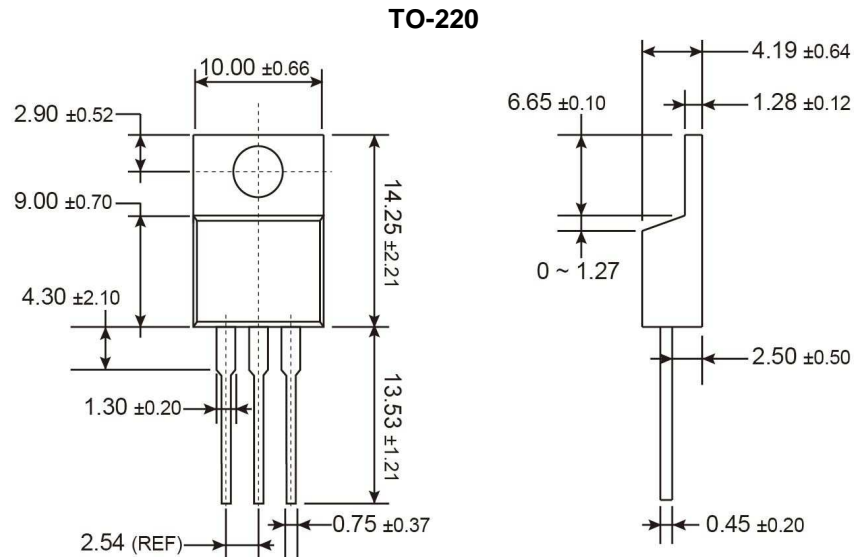
**Capacitance**



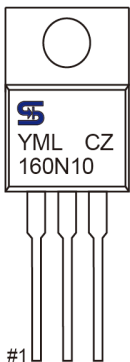
**Gate Charge**



**PACKAGE OUTLINE DIMENSIONS** (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 (1~9, A~Z)

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