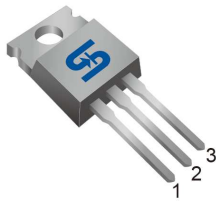


TO-220



**Pin Definition:**

1. Gate
2. Drain
3. Source

**PRODUCT SUMMARY**

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)	I <sub>D</sub> (A)
100	5.5 @ V <sub>GS</sub> =10V	160

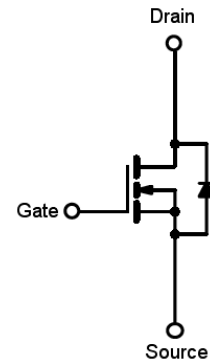
**Features**

- Advanced Trench Technology
- Low R<sub>DS(ON)</sub> 5.5mΩ (Max.)
- Low gate charge typical @ 154nC (Typ.)
- Low Crss typical @ 260pF (Typ.)

**Ordering Information**

Part No.	Package	Packing
TSM160N10CZ C0	TO-220	50pcs / Tube

**Block Diagram**



N-Channel MOSFET

**Absolute Maximum Rating** (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	100	V	
Gate-Source Voltage	V <sub>GS</sub>	±20	V	
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	160	A
		T <sub>C</sub> =70°C	127	
		T <sub>A</sub> =25°C	14.2	
		T <sub>A</sub> =70°C	11.4	
Drain Current-Pulsed Note 1	I <sub>DM</sub>	620	A	
Avalanche Current, L=0.5mH	I <sub>AS</sub> , I <sub>AR</sub>	40	A	
Avalanche Energy, L=0.5mH	E <sub>AS</sub> , E <sub>AR</sub>	400	mJ	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	300	W
		T <sub>C</sub> =70°C	210	
		T <sub>A</sub> =25°C	2.4	
		T <sub>A</sub> =70°C	1.68	
Storage Temperature Range	T <sub>STG</sub>	-55 to +175	°C	
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +175	°C	

\* Limited by maximum junction temperature

**Thermal Performance**

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	Rθ <sub>JC</sub>	0.5	°C/W
Thermal Resistance - Junction to Ambient	Rθ <sub>JA</sub>	62.5	°C/W

Notes: Surface mounted on FR4 board t ≤ 10sec

### Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	100	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 30A$	$R_{DS(ON)}$	--	4.5	5.5	mΩ
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 80V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	±100	nA
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 30V, I_D = 30A,$ $V_{GS} = 10V$	$Q_g$	--	154	--	nC
Gate-Source Charge		$Q_{gs}$	--	35	--	
Gate-Drain Charge		$Q_{gd}$	--	40	--	
Input Capacitance	$V_{DS} = 30V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	9840	--	pF
Output Capacitance		$C_{oss}$	--	750	--	
Reverse Transfer Capacitance		$C_{rss}$	--	260	--	
<b>Switching</b>						
Turn-On Delay Time	$V_{GS} = 10V, V_{DS} = 30V,$ $R_G = 3.3\Omega$	$t_{d(on)}$	--	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>Drain-Source Diode Characteristics and Maximum Rating</b>						
Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=30A$	$V_{SD}$	-	0.8	1.3	V
Reverse Recovery Time	$I_S = 30A, T_J=25^\circ C$ $di/dt = 100A/\mu s$	$t_{fr}$		120		nS
Reverse Recovery Charge		$Q_{fr}$		160		nC

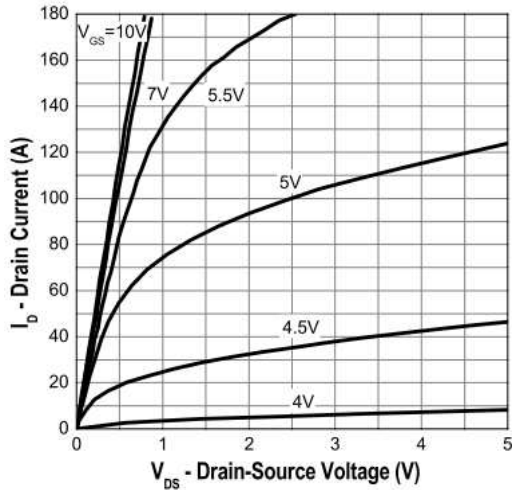
#### Notes:

- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- $R\theta_{JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R\theta_{JC}$  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 in still air

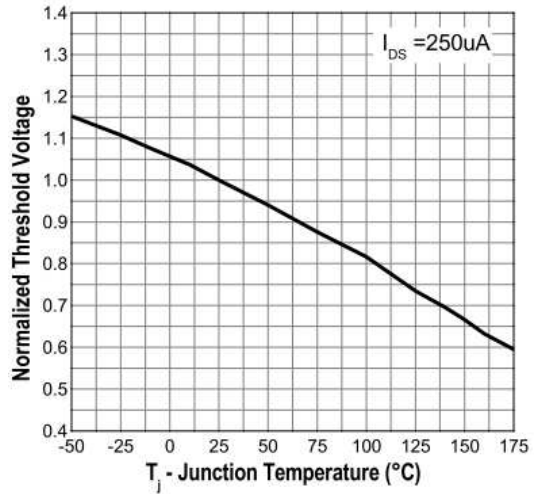


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

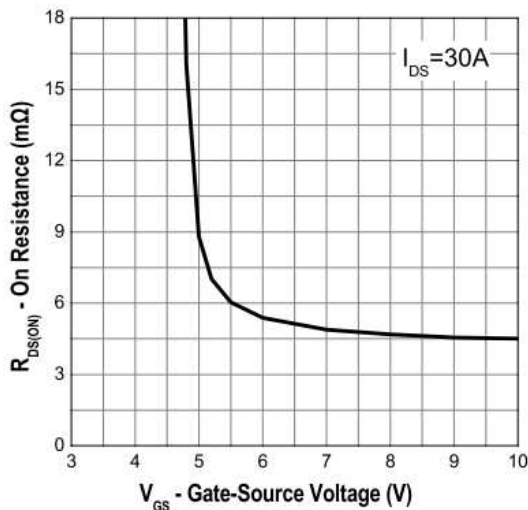
**Output Characteristics**



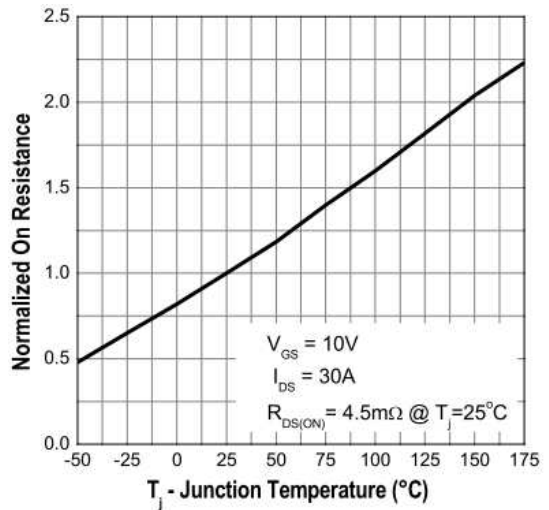
**Gate Threshold Voltage**



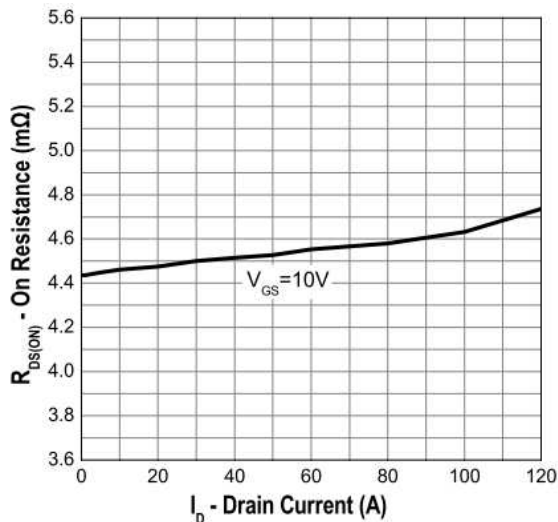
**Gate Source On Resistance**



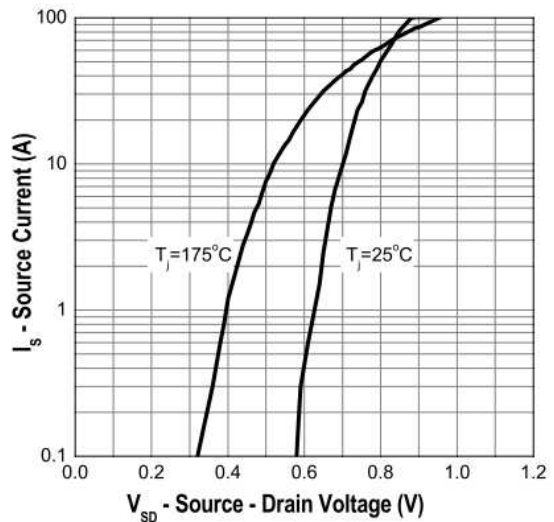
**Drain-Source On Resistance**



**Drain-Source On-Resistance**



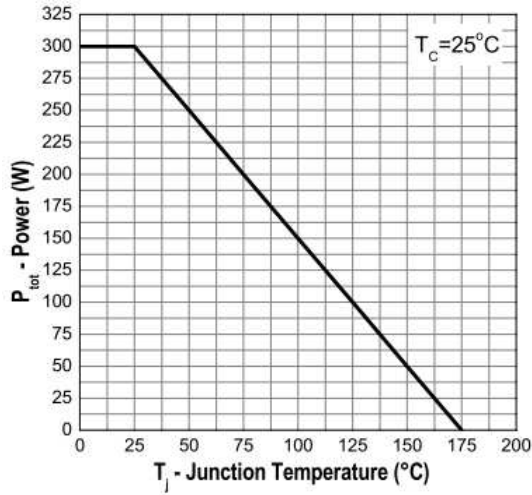
**Source-Drain Diode Forward Voltage**



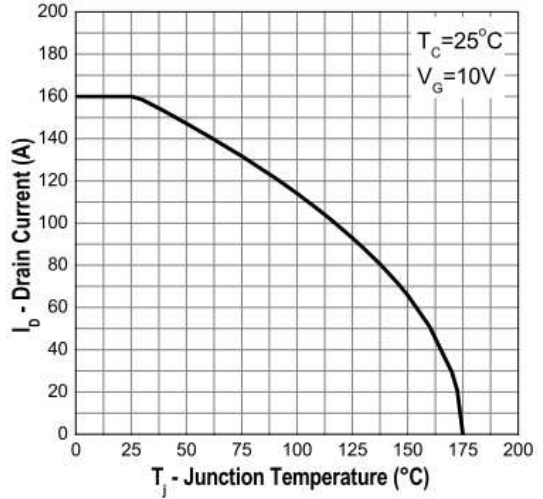


**Electrical Characteristics Curve** ( $T_a = 25^\circ\text{C}$ , unless otherwise noted)

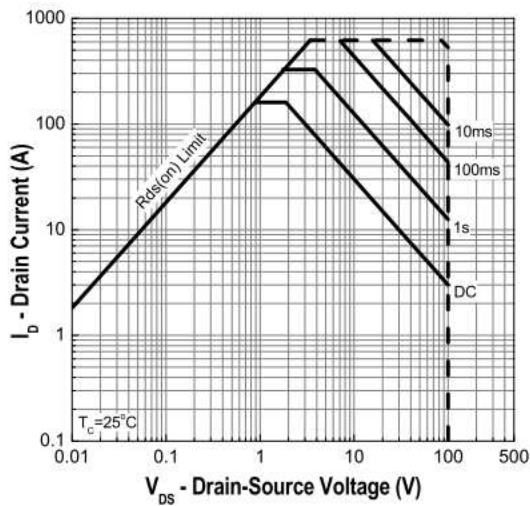
**Power Derating**



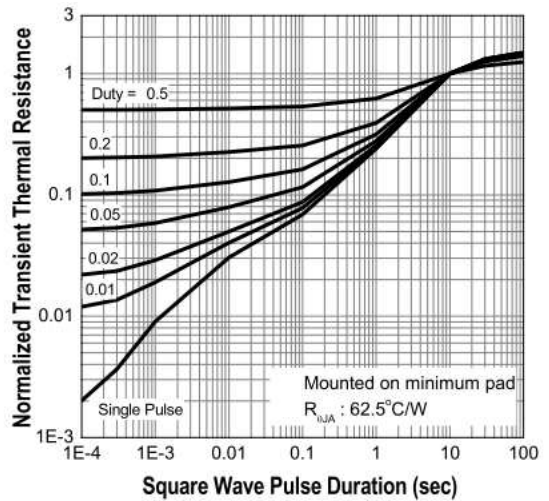
**Drain Current vs. Junction Temperature**



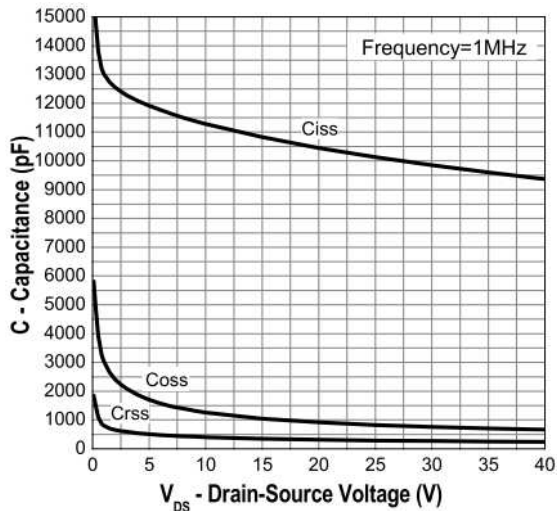
**Safe Operation Area**



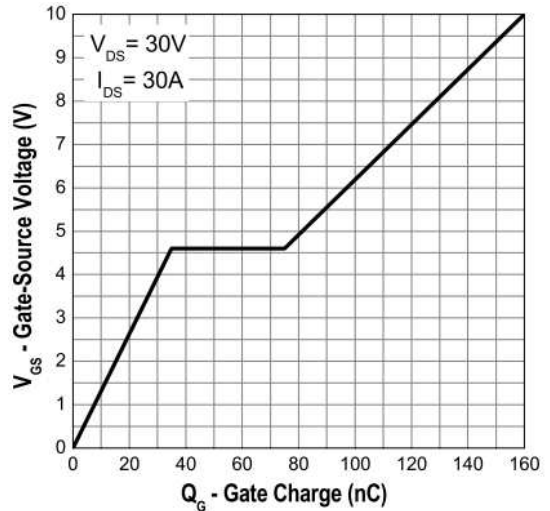
**Transient Thermal Impedance**



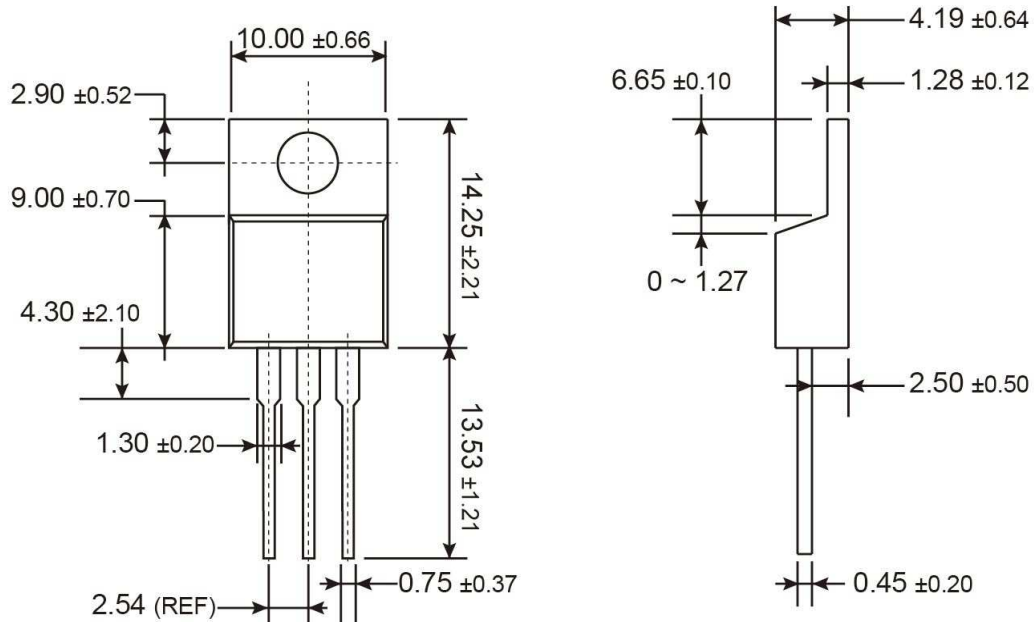
**Capacitance**



**Gate Charge**

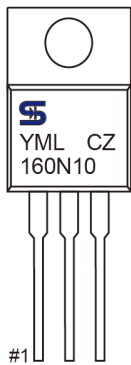


### TO-220 Mechanical Drawing



Unit: Millimeters

### Marking Diagram



- Y** = Year Code
- M** = Month Code
- (**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
- L** = Lot Code

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