



**Pin Definition:**

1. Gate
2. Drain
3. Source

**PRODUCT SUMMARY**

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
60	3.1 @ $V_{GS}=10V$	210

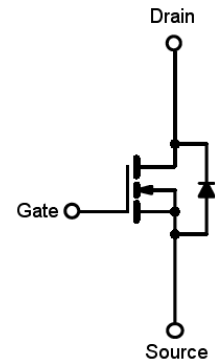
**Features**

- Advanced Trench Technology
- Low  $R_{DS(ON)}$  3.1m $\Omega$  (Max.)
- Low gate charge typical @ 160nC (Typ.)
- Low  $C_{rss}$  typical @ 300pF (Typ.)

**Ordering Information**

Part No.	Package	Packing
TSM210N06CZ C0	TO-220	50pcs / Tube

**Block Diagram**



N-Channel MOSFET

**Absolute Maximum Rating** ( $T_a = 25^\circ C$  unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	$T_C=25^\circ C$	210
		$T_C=70^\circ C$	170
		$T_A=25^\circ C$	19
		$T_A=70^\circ C$	15.2
Drain Current-Pulsed Note 1	$I_{DM}$	650	A
Avalanche Current, L=0.3mH	$I_{AS}, I_{AR}$	113	A
Avalanche Energy, L=0.3mH	$E_{AS}, E_{AR}$	1900	mJ
Maximum Power Dissipation	$P_D$	$T_C=25^\circ C$	250
		$T_C=70^\circ C$	160
		$T_A=25^\circ C$	2
		$T_A=70^\circ C$	1.3
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ C$

\* Limited by maximum junction temperature

**Thermal Performance**

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta_{JC}}$	0.5	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R_{\theta_{JA}}$	62.5	$^\circ C/W$

Notes: Surface mounted on FR4 board  $t \leq 10sec$

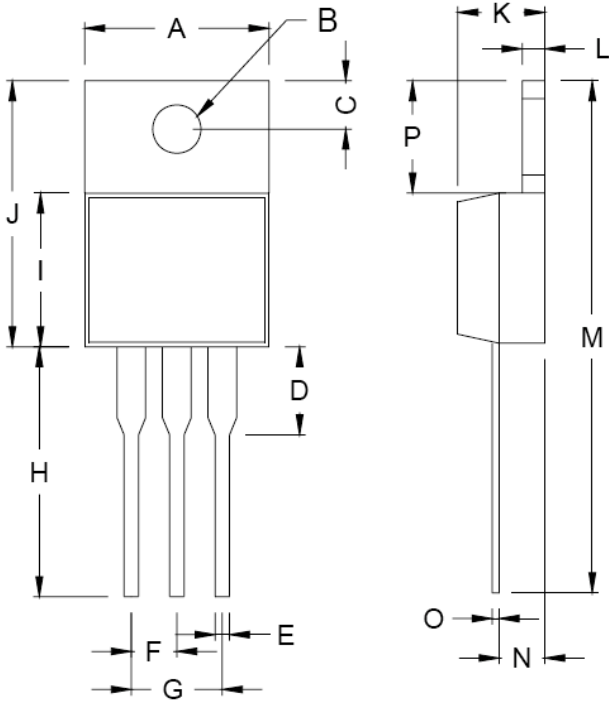
**Electrical Specifications** ( $T_a = 25^\circ\text{C}$  unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	60	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 90A$	$R_{DS(ON)}$	--	2.6	3.1	m $\Omega$
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	2	3	4	V
Zero Gate Voltage Drain Current	$V_{DS} = 48V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 30V, I_D = 30A,$ $V_{GS} = 10V$	$Q_g$	--	160	--	nC
Gate-Source Charge		$Q_{gs}$	--	35	--	
Gate-Drain Charge		$Q_{gd}$	--	40	--	
Input Capacitance	$V_{DS} = 30V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	$C_{iss}$	--	7900	--	pF
Output Capacitance		$C_{oss}$	--	780	--	
Reverse Transfer Capacitance		$C_{rss}$	--	30	--	
<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	$V_{GS}=0V, I_S=90A$	$V_{SD}$	-	0.8	1.3	V
Reverse Recovery Time	$I_S = 90A, T_J=25^\circ\text{C}$ $di/dt = 100A/\mu s$	$t_{fr}$		70		nS
Reverse Recovery Charge		$Q_{fr}$		115		nC

**Notes:**

- Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
- $R\theta_{JA}$  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

**TO-220 Mechanical Drawing**



TO-220 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	10.000	10.500	0.394	0.413
B	3.740	3.910	0.147	0.154
C	2.440	2.940	0.096	0.116
D	-	6.350	-	0.250
E	0.381	1.106	0.015	0.040
F	2.345	2.715	0.092	0.058
G	4.690	5.430	0.092	0.107
H	12.700	14.732	0.500	0.581
J	14.224	16.510	0.560	0.650
K	3.556	4.826	0.140	0.190
L	0.508	1.397	0.020	0.055
M	27.700	29.620	1.060	1.230
N	2.032	2.921	0.080	0.115
O	0.255	0.610	0.010	0.024
P	5.842	6.858	0.230	0.270

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