



TO-220

Pin Definition:

1. Gate
2. Drain
3. Source

PRODUCT SUMMARY

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

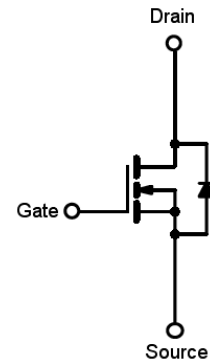
Features

- Advanced Trench Technology
- Low $R_{DS(ON)}$ 3.1m Ω (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}	± 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 $t \leq 10sec$

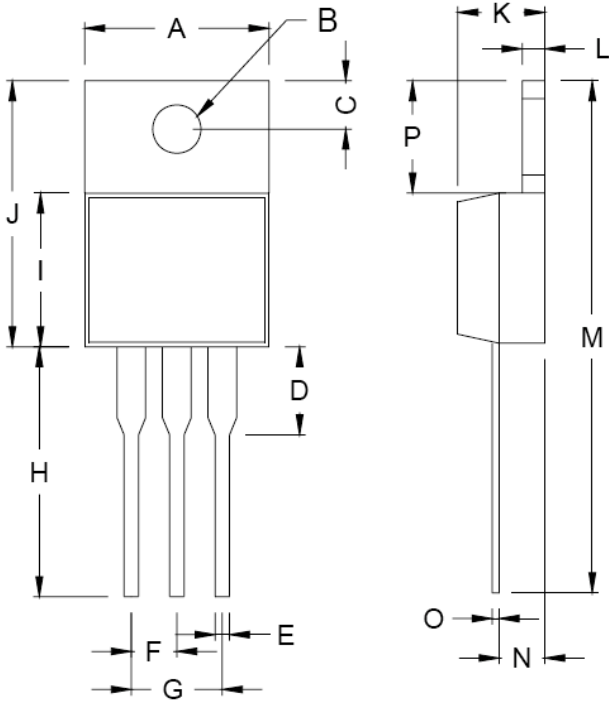
Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	BV _{DSS}	60	--	--	V
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 90A	R _{DS(ON)}	--	2.6	3.1	mΩ
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	V _{GS(TH)}	2	3	4	V
Zero Gate Voltage Drain Current	V _{DS} = 48V, V _{GS} = 0V	I _{DSS}	--	--	1	μA
Gate Body Leakage	V _{GS} = ±20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Dynamic						
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 = 1.0MHz	C _{iss}	--	7900	--	pF
Output Capacitance		C _{oss}	--	780	--	
Reverse Transfer Capacitance		C _{rss}	--	30	--	
Switching						
Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 30V, R _G = 3.3Ω	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	--	
Drain-Source Diode Characteristics and Maximum Rating						
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°C di/dt = 100A/μs	t _{fr}		70		nS
Reverse Recovery Charge		Q _{fr}		115		nC

Notes:

- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- R_{θJA} 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_{θJC} is guaranteed by design while R_{θCA} is determined by the user's board design. R_{θJA} 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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