



Power MOSFET

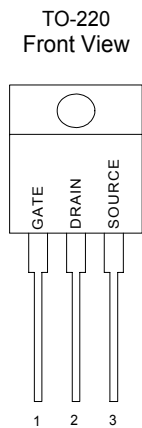
Features

- Silicon Gate for Fast Switching Speeds
- Low $R_{DS(on)}$ to Minimize On-Losses. Specified at Elevated Temperature
- Rugged – SOA is Power Dissipation Limited
- Source-to-Drain Characterized for Use With Inductive Loads

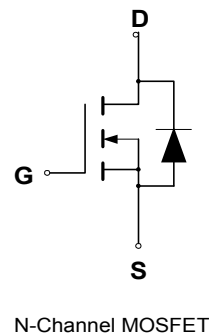
General Description

This Power MOSFET is designed for low voltage, high speed power switching applications such as switching regulators, converters, solenoid and relay drivers.

Pin Configuration



Symbol



Ordering Information

Part Number	Package
CTM18N20N220	TO-220

Absolute Maximum Ratings

Rating	Symbol	Value	Unit
Drain to Current - Continuous	I_D	18	A
- Pulsed	I_{DM}	72	
Gate-to-Source Voltage - Continuous	V_{GS}	± 20	V
- Non-repetitive	V_{GSM}	± 40	V
Total Power Dissipation	P_D	125	W
Derate above 25°C		1.00	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance - Junction to Case	R_{thJC}	1.00	°C/W
- Junction to Ambient	R_{thJA}	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	



Electrical Characteristics

Unless otherwise specified, $T_J = 25^\circ\text{C}$

Characteristic	Symbol	CTM18N20			Units
		Min	Typ	Max	
Drain-Source Breakdown Voltage ($V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$)	$V_{(BR)DSS}$	200			V
Drain-Source Leakage Current ($V_{DS} = 200\text{V}, V_{GS} = 0\text{ V}$) ($V_{DS} = 200\text{V}, V_{GS} = 0\text{ V}, T_J = 125^\circ\text{C}$)	I_{DSS}			0.2 1.0	mA
Gate-Source Leakage Current-Forward ($V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$)	I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse ($V_{GS} = -20\text{V}, V_{DS} = 0\text{ V}$)	I_{GSSR}			-100	nA
Gate Threshold Voltage ($V_{DS} = V_{GS}, I_D = 250\ \mu\text{A}$)	$V_{GS(th)}$	2.0		4.0	V
Static Drain-Source On-Resistance ($V_{GS} = 10\text{ V}, I_D = 10\text{A}$) *	$R_{DS(on)}$			0.18	Ohm
Drain-Source On-Voltage ($V_{GS} = 10\text{ V}, I_D = 5\text{A}$)	$V_{DS(on)}$			6.0	V
Forward Transconductance ($V_{DS} = 15\text{ V}, I_D = 10\text{A}$) *	g_{FS}	6.0			S
Input Capacitance	$(V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz})$	C_{iss}		1600	pF
Output Capacitance		C_{oss}		750	pF
Reverse Transfer Capacitance		C_{rss}		300	pF
Turn-On Delay Time	$(V_{DD} = 30\text{ V}, I_D = 10\text{ A},$ $V_{GS} = 10\text{ V}, R_G = 4.7\text{ Ohm})^*$	$t_{d(on)}$		30	ns
Rise Time		t_r		60	ns
Turn-Off Delay Time		$t_{d(off)}$		80	ns
Fall Time		t_f		60	ns
Total Gate Charge	$(V_{DS} = 160\text{V}, I_D = 18\text{A},$ $V_{GS} = 10\text{ V})^*$	Q_g	36	63	nC
Gate-Source Charge		Q_{gs}	16		nC
Gate-Drain Charge		Q_{gd}	26		nC
Internal Drain Inductance (Measured from the drain lead 0.25" from package to center of die)	L_D		4.5		nH
Internal Source Inductance (Measured from the source lead 0.25" from package to source bond pad)	L_S		7.5		nH
SOURCE-DRAIN DIODE CHARACTERISTICS					
Forward On-Voltage	$(I_S = 18\text{ A}, V_{GS} = 0\text{ V},$ $d_i/d_t = 100\text{A}/\mu\text{s})$	V_{SD}		1.8 2.0	V
Forward Turn-On Time		t_{on}		**	ns
Reverse Recovery Time		t_{rr}		450	ns

* Pulse Test: Pulse Width $\leq 300\ \mu\text{s}$, Duty Cycle $\leq 2\%$

** Negligible, Dominated by circuit inductance



Typical Electrical Characteristics

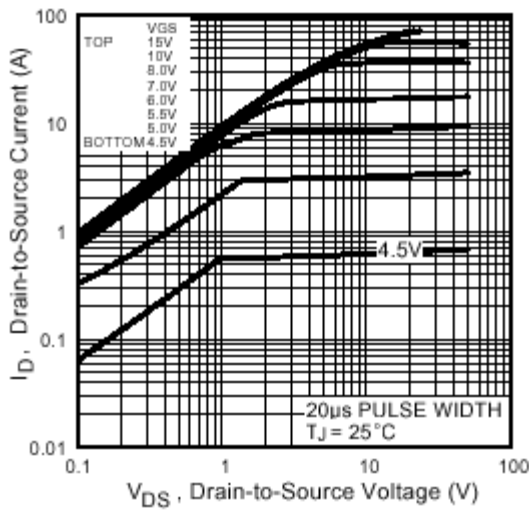


Fig 1. Typical Output Characteristics

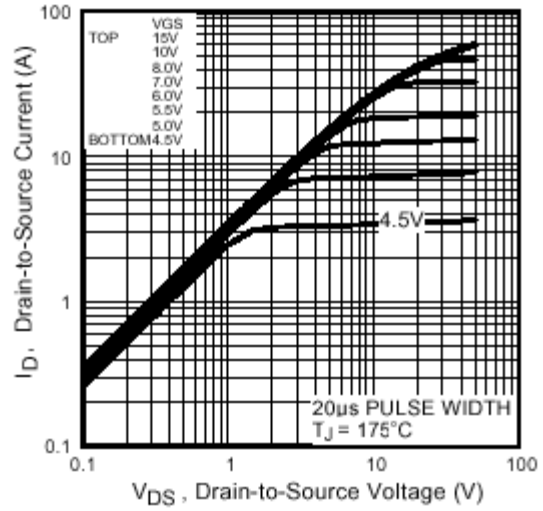


Fig 2. Typical Output Characteristics

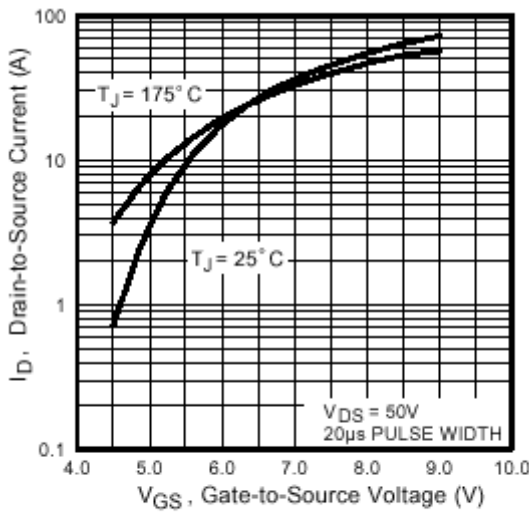


Fig 3. Typical Transfer Characteristics

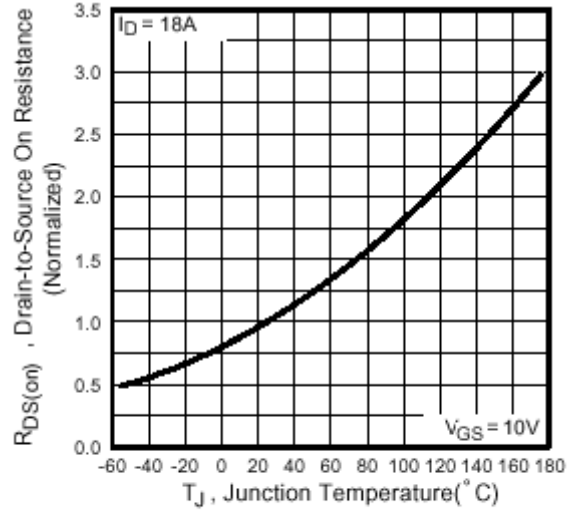


Fig 4. Normalized On-Resistance Vs. Temperature

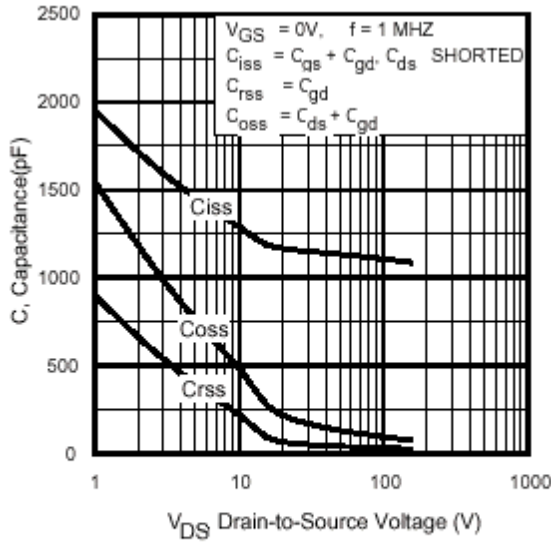


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

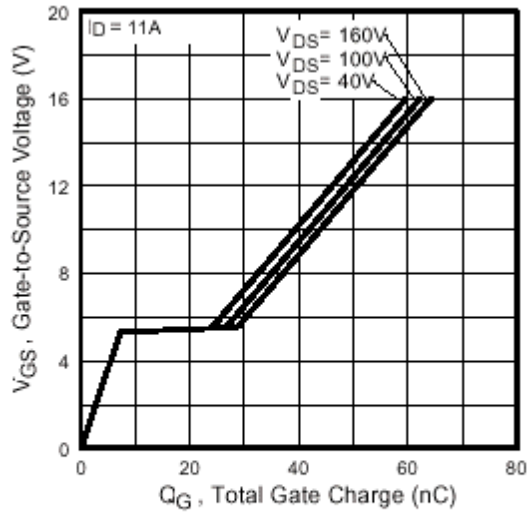


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

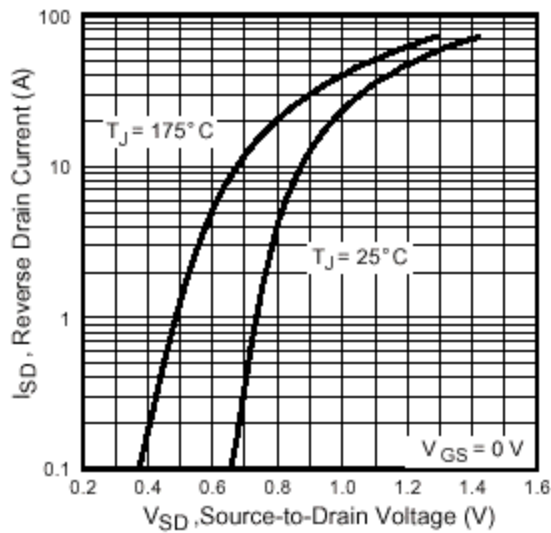


Fig 7. Typical Source-Drain Diode Forward Voltage

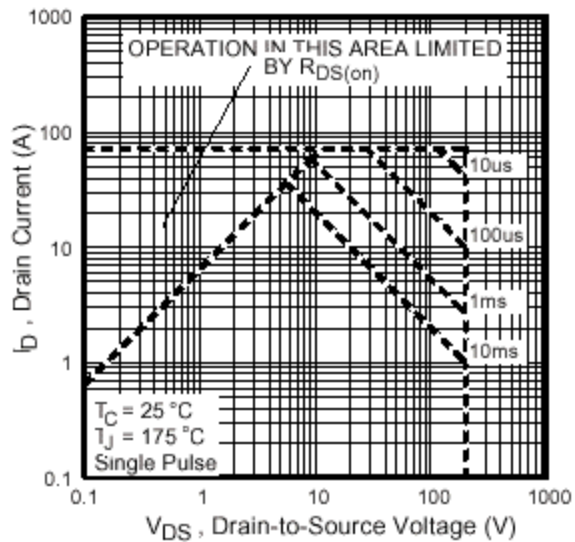


Fig 8. Maximum Safe Operating Area

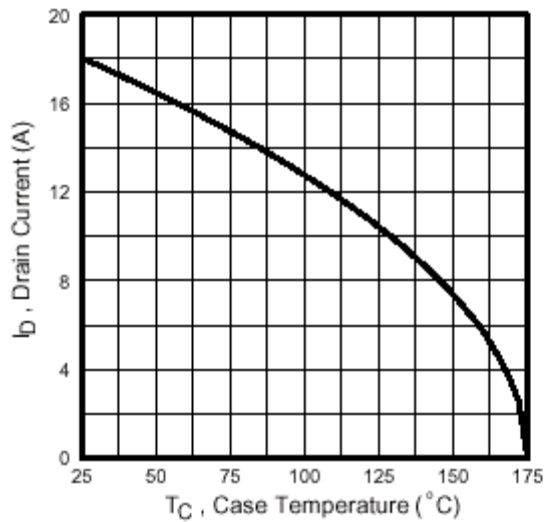


Fig 9. Maximum Drain Current Vs. Case Temperature

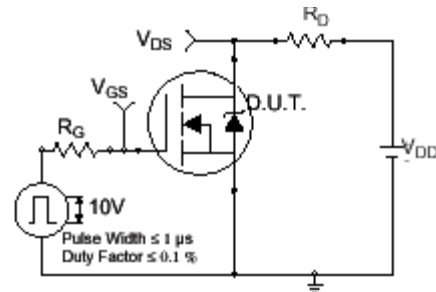


Fig 10a. Switching Time Test Circuit

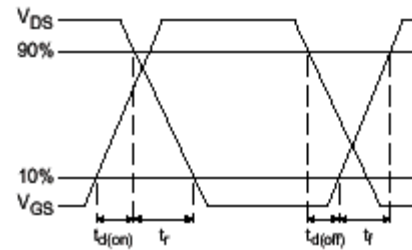


Fig 10b. Switching Time Waveforms

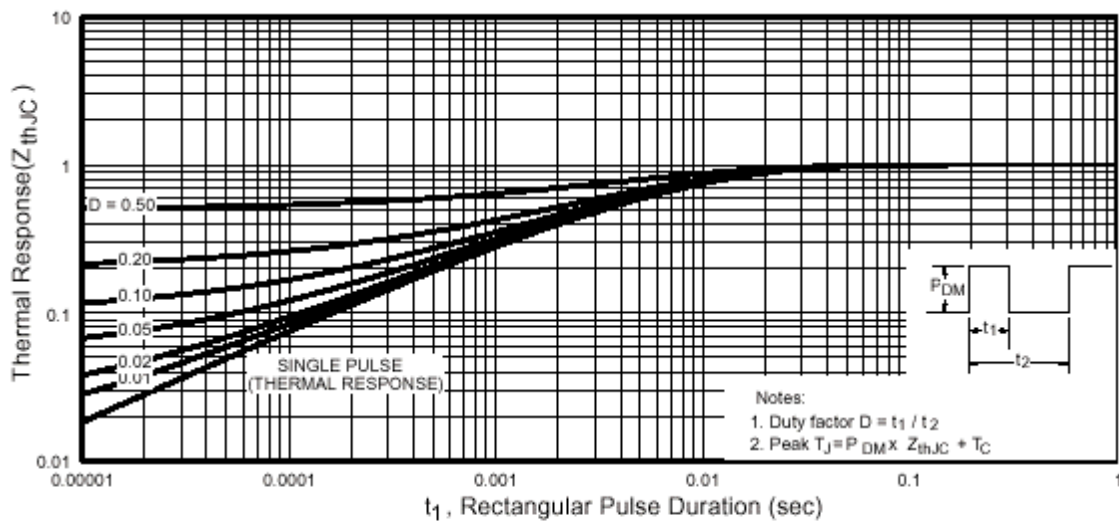
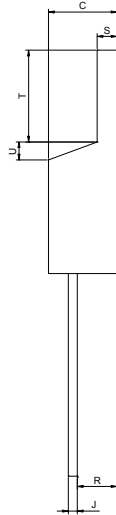
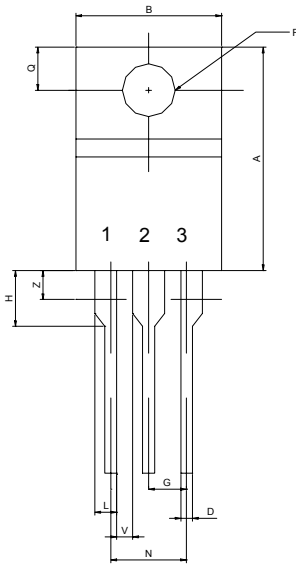


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case



Package Dimension

TO-220



PIN 1: GATE
 PIN 2: DRAIN
 PIN 3: SOURCE

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	14.48	---	15.75	0.570	---	0.620
B	9.86	---	10.38	0.380	---	0.405
C	4.07	---	4.82	0.160	---	0.190
D	0.64	---	0.89	0.025	---	0.035
F	3.61	---	3.73	0.142	---	0.147
G	2.42	---	2.66	0.095	---	0.105
H	2.80	---	3.93	0.110	---	0.155
J	0.46	---	0.64	0.018	---	0.025
K	12.70	---	14.27	0.500	---	0.562
L	1.15	---	1.52	0.045	---	0.060
N	4.83	---	5.33	0.190	---	0.210
Q	2.54	---	3.04	0.100	---	0.120
R	2.04	---	2.79	0.080	---	0.110
S	1.15	---	1.39	0.045	---	0.055
T	5.97	---	6.47	0.235	---	0.255
U	0.00	---	1.27	0.000	---	0.050
V	1.15	---	---	0.045	---	---
Z	---	---	2.04	---	---	0.080