MTP20N15E

Power MOSFET
20 Amps, 150 Volts
N−Channel TO−220

This Power MOSFET is designed to withstand high energy in the avalanche and commutation modes. The energy efficient design also offers a drain−to−source diode with a fast recovery time. Designed for low voltage, high speed switching applications in power converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional safety margin against unexpected voltage transients.

- Avalanche Energy Specified
- Source−to−Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and $V_{DS(on)}$ Specified at Elevated Temperature
- This is a Pb−Free Device*

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain−Source Voltage	V_{DSS}	150	Vdc
Drain−Gate Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	150	Vdc
Gate−Source Voltage − Continuous − Non−Repetitive ($t_p \le 10$ ms)	 V_{GS} V_{GSM}	 ± 20 ± 32	Vdc
Drain − Continuous − Continuous @ 100°C − Single Pulse ($t_p \le 10$ μs)	I_D I_D I_{DM}	20 12 60	Adc
Total Power Dissipation Derate above 25°C	P_D	112 0.9	Watts W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 150	°C
Single Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 120 Vdc, V_{GS} = 10 Vdc, I_L = 20 Apk, L = 0.3 mH)	E_{AS}	60	mJ
Thermal Resistance − Junction to Case − Junction to Ambient	 $R_{\theta JC}$ $R_{\theta JA}$	 1.1 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

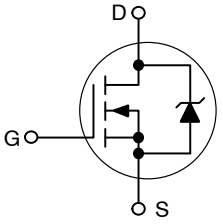
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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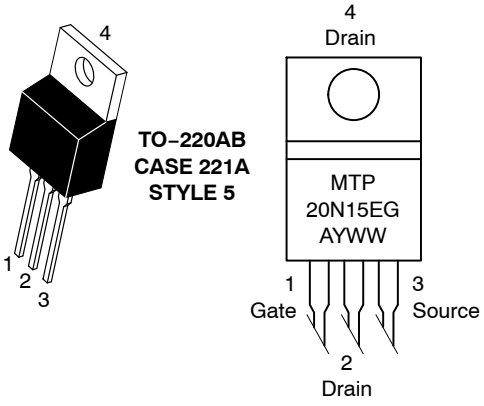
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20 AMPERES
150 VOLTS
$R_{DS(on)}$ = 130 mΩ

N−Channel



MARKING DIAGRAM & PIN ASSIGNMENT



TO−220AB
CASE 221A
STYLE 5

MTP20N15E	= Device Code
A	= Assembly Location
Y	= Year
WW	= Work Week
G	= Pb−Free Package

ORDERING INFORMATION

Device	Package	Shipping
MTP20N15EG	TO−220AB (Pb−Free)	50 Units/Rail

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 0.25 mAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	150 –	– TBD	– –	Vdc mV/°C
Zero Gate Voltage Collector Current (V_{DS} = 150 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 150 Vdc, V_{GS} = 0 Vdc, T_J = 125°C)		I_{DSS}	– –	– –	10 100	μAdc
Gate−Body Leakage Current (V_{GS} = ± 20 Vdc, V_{DS} = 0)		$I_{GSS(f)}$ $I_{GSS(r)}$	– –	– –	100 100	nAdc
ON CHARACTERISTICS (Note 1.)						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 0.25 mAdc) Temperature Coefficient (Negative)		$V_{GS(th)}$	2.0 –	– TBD	4.0 –	Vdc mV/°C
Static Drain−Source On−Resistance (V_{GS} = 10 Vdc, I_D = 10 Adc)		$R_{DS(on)}$	–	0.12	0.13	Ohm
Drain−Source On−Voltage (V_{GS} = 10 Vdc) (I_D = 20 Adc) (I_D = 10 Adc, T_J = 125°C)		$V_{DS(on)}$	– –	– –	2.8 2.6	Vdc
Forward Transconductance (V_{DS} = 13 Vdc, I_D = 10 Adc)		g_{FS}	8.0	11	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	1133	1627	pF
Output Capacitance		C_{oss}	–	332	474	
Transfer Capacitance		C_{rss}	–	105	174	
SWITCHING CHARACTERISTICS (Note 2.)						
Turn−On Delay Time	(V_{DD} = 75 Vdc, I_D = 20 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω)	$t_{d(on)}$	–	11	25	ns
Rise Time		t_r	–	77	153	
Turn−Off Delay Time		$t_{d(off)}$	–	33	67	
Fall Time		t_f	–	49	97	
Gate Charge	(V_{DS} = 120 Vdc, I_D = 20 Adc, V_{GS} = 10 Vdc)	Q_T	–	39.1	55.9	nC
		Q_1	–	7.5	–	
		Q_2	–	22	–	
		Q_3	–	17	–	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward On−Voltage (Note 1.)	(I_S = 20 Adc, V_{GS} = 0 Vdc) (I_S = 20 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	– –	– –	1.5 –	Vdc
Reverse Recovery Time	(I_S = 20 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	–	160	–	ns
		t_a	–	123	–	
		t_b	–	36.5	–	
Reverse Recovery Stored Charge		Q_{RR}	–	1.1	–	μC

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.

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