

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 ($T_C = 25^\circ\text{C}$ unless otherwise noted)

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

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.

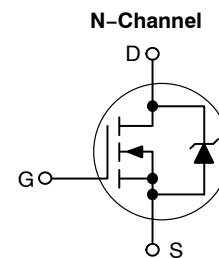


ON Semiconductor™

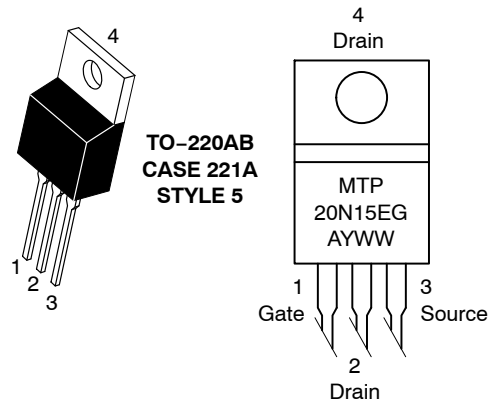
<http://onsemi.com>

**20 AMPERES
150 VOLTS**

$R_{DS(on)} = 130\text{ m}\Omega$



MARKING DIAGRAM & PIN ASSIGNMENT



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

MTP20N15E

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	-
	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.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales