

VS80N08AT-VB Datasheet

N-Channel 80 V (D-S) MOSFET

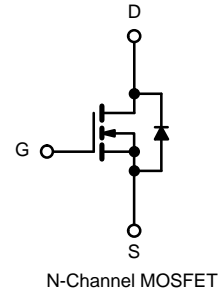
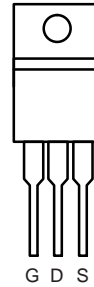
PRODUCT SUMMARY		
V_{DS}	80	V
$R_{DS(on)} V_{GS} = 10\text{ V}$	6	$m\Omega$
$R_{DS(on)} V_{GS} = 4.5\text{ V}$	14	$m\Omega$
I_D	120	A
Configuration	Single	

FEATURES

- Trench Power MOSFET
- 100 % R_g and UIS Tested


RoHS
 COMPLIANT

TO-220AB



ABSOLUTE MAXIMUM RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V_{DS}	80	V	
Gate-Source Voltage	V_{GS}	± 20		
Continuous Drain Current ($T_J = 150\text{ }^{\circ}\text{C}$)	$T_C = 25\text{ }^{\circ}\text{C}$	120	A	
	$T_C = 70\text{ }^{\circ}\text{C}$	85 ^a		
	$T_A = 25\text{ }^{\circ}\text{C}$	28.6 ^{b, c}		
	$T_A = 70\text{ }^{\circ}\text{C}$	24.9 ^{b, c}		
Pulsed Drain Current ($t = 100\text{ }\mu\text{s}$)	I_{DM}	350		
Continuous Source-Drain Diode Current	$T_C = 25\text{ }^{\circ}\text{C}$	100		
	$T_A = 25\text{ }^{\circ}\text{C}$	4.5 ^{b, c}		
Single Pulse Avalanche Current	$L = 0.1\text{ mH}$	30	mJ	
Single Pulse Avalanche Energy		45		
Maximum Power Dissipation	$T_C = 25\text{ }^{\circ}\text{C}$	180	W	
	$T_C = 70\text{ }^{\circ}\text{C}$	120		
	$T_A = 25\text{ }^{\circ}\text{C}$	5 ^{b, c}		
	$T_A = 70\text{ }^{\circ}\text{C}$	3.2 ^{b, c}		
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^{\circ}\text{C}$	
Soldering Recommendations (Peak Temperature) ^{d, e}		260		

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^{b, f}	$t \leq 10\text{ s}$	R_{thJA}	20	25	$^{\circ}\text{C/W}$
Maximum Junction-to-Case (Drain)	Steady State	R_{thJC}	1.5	2.0	

Notes

- Package limited.
- Surface mounted on 1" x 1" FR4 board.
- $t = 10\text{ s}$.
- The TO-220 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper tip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.
- Rework conditions: manual soldering with a soldering iron is not recommended for leadless components.
- Maximum under steady state conditions is $70\text{ }^{\circ}\text{C/W}$.

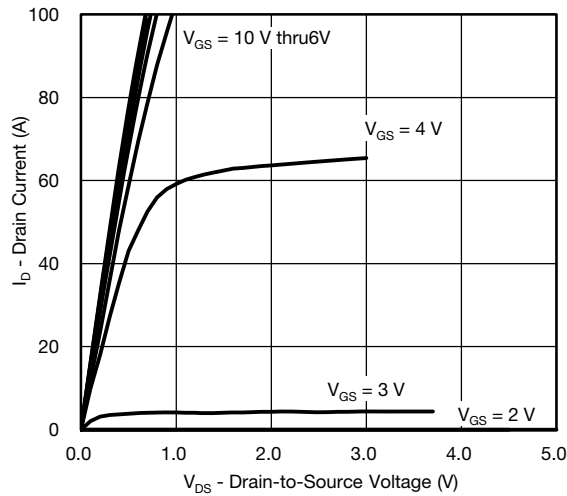
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	80			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		37		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 6.1		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	2.5		4.5	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 80 V, V _{GS} = 0 V			1	μA
		V _{DS} = 80 V, V _{GS} = 0 V, T _J = 55 °C			10	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 10 V	85			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		6		mΩ
		V _{GS} = 6 V, I _D = 15 A		10		
		V _{GS} = 4.5 V, I _D = 10 A		14		
Forward Transconductance ^a	g _{fs}	V _{DS} = 10 V, I _D = 20 A		60		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 40 V, V _{GS} = 0 V, f = 1 MHz		7000		pF
Output Capacitance	C _{oss}			1400		
Reverse Transfer Capacitance	C _{rss}			560		
Total Gate Charge	Q _g	V _{DS} = 40 V, V _{GS} = 10 V, I _D = 10 A		35.5		nC
		V _{DS} = 40 V, V _{GS} = 6 V, I _D = 10 A		22		
		V _{DS} = 40 V, V _{GS} = 4.5 V, I _D = 10 A		17.1		
Gate-Source Charge	Q _{gs}			5.3		
Gate-Drain Charge	Q _{gd}			7.3		
Output Charge	Q _{oss}	V _{DS} = 40 V, V _{GS} = 0 V		57	86	
Gate Resistance	R _g	f = 1 MHz	0.5	1.3	2	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 40 V, R _L = 4 Ω I _D ≅ 10 A, V _{GEN} = 10 V, R _g = 1 Ω		12	24	ns
Rise Time	t _r			8	16	
Turn-Off DelayTime	t _{d(off)}			32	64	
Fall Time	t _f			7	14	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 40 V, R _L = 4 Ω I _D ≅ 10 A, V _{GEN} = 6.0 V, R _g = 1 Ω		14	28	
Rise Time	t _r			11	22	
Turn-Off DelayTime	t _{d(off)}			30	60	
Fall Time	t _f			8	16	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C		75		A
Pulse Diode Forward Current (t = 100 μs)	I _{SM}			150		
Body Diode Voltage	V _{SD}	I _S = 5 A		0.76	1.1	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 10 A, dI/dt = 100 A/μs, T _J = 25 °C		38	75	ns
Body Diode Reverse Recovery Charge	Q _{rr}			36	70	nC
Reverse Recovery Fall Time	t _a			19		ns
Reverse Recovery Rise Time	t _b			19		

Notes

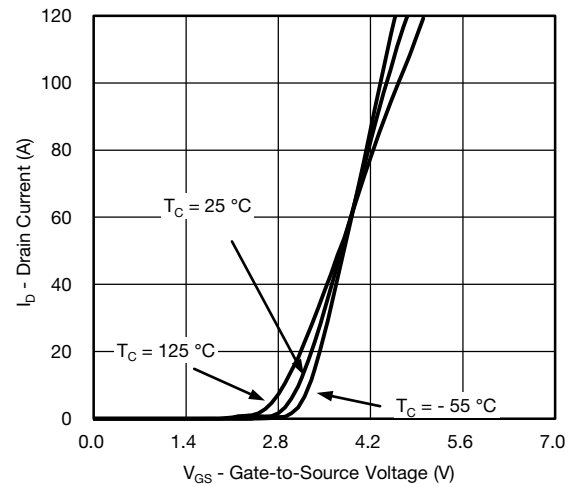
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

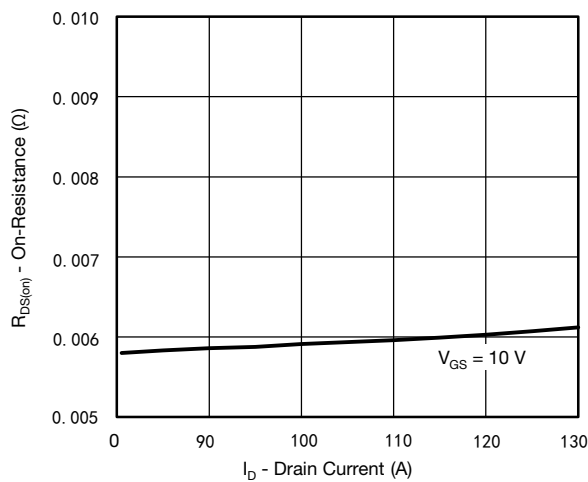
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



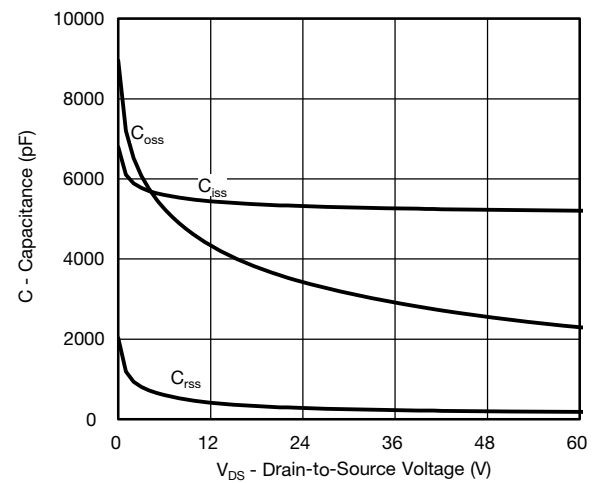
Output Characteristics



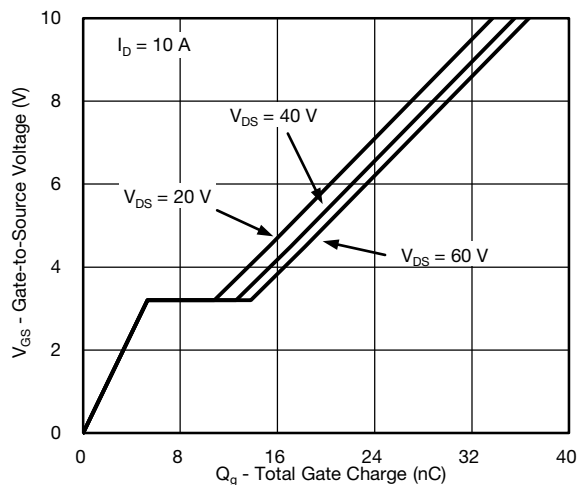
Transfer Characteristics



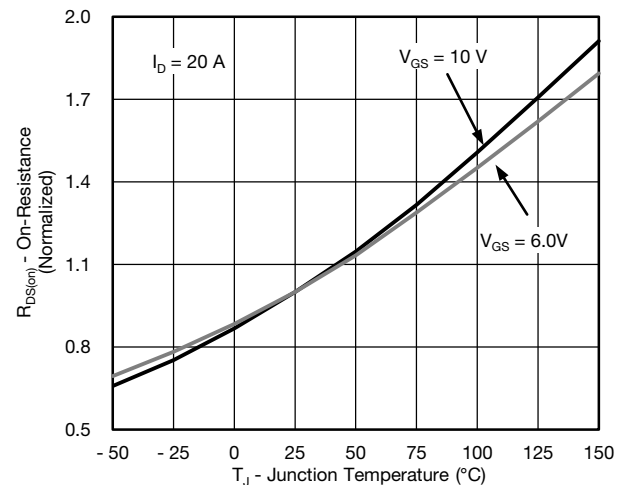
On-Resistance vs. Drain Current



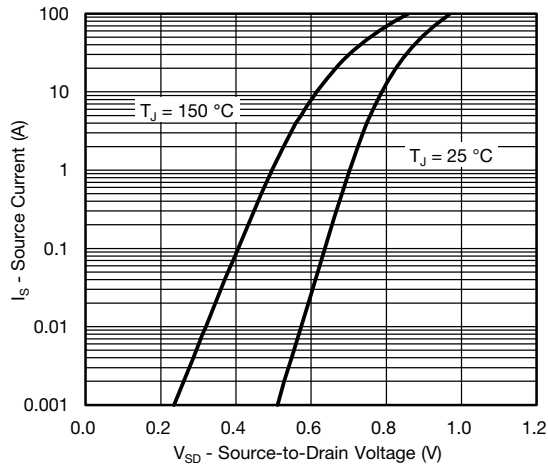
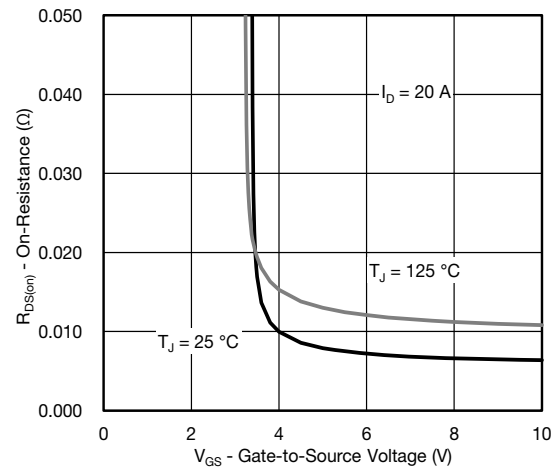
Capacitance

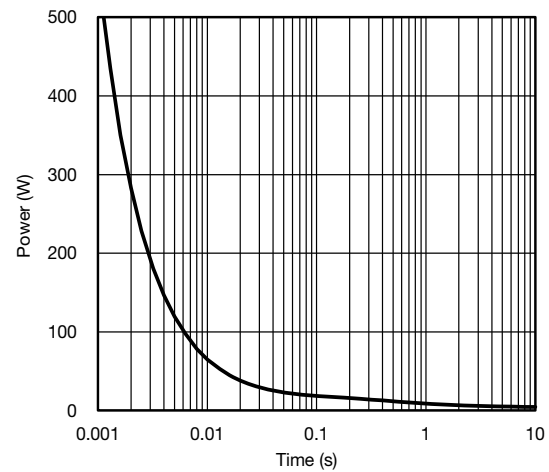


Gate Charge



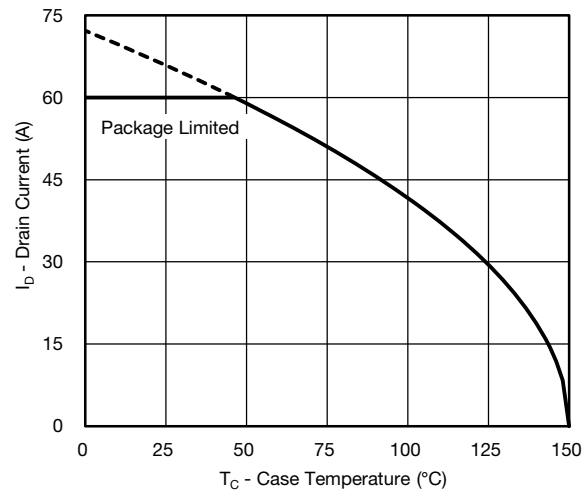
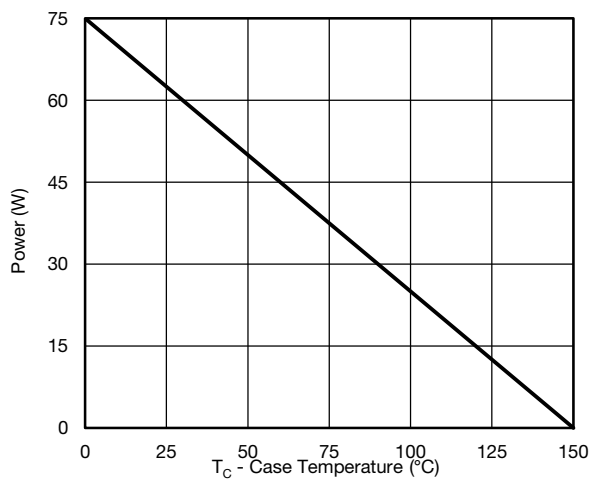
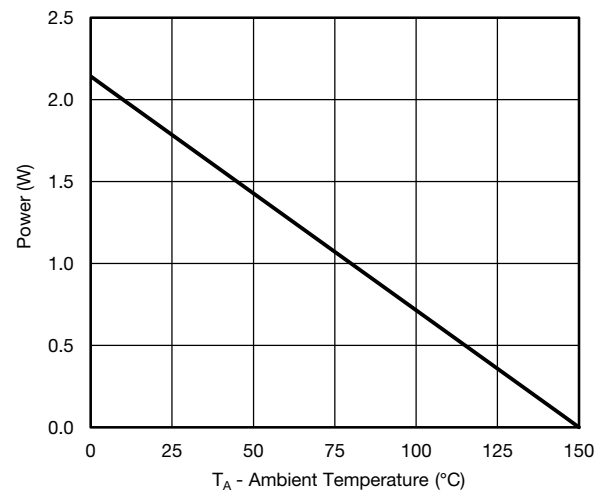
On-Resistance vs. Junction Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Source-Drain Diode Forward Voltage

On-Resistance vs. Gate-to-Source Voltage

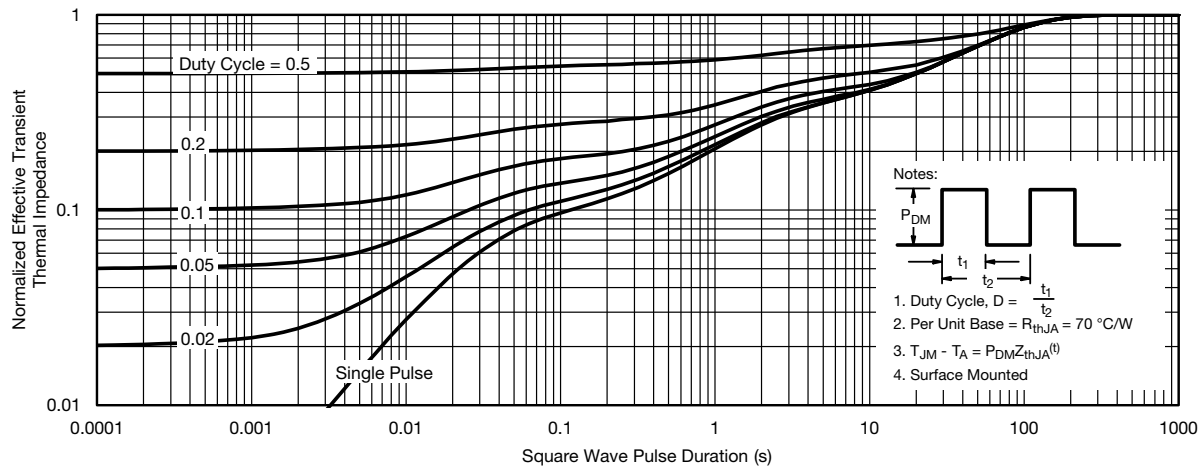
Threshold Voltage

Single Pulse Power, Junction-to-Ambient


* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

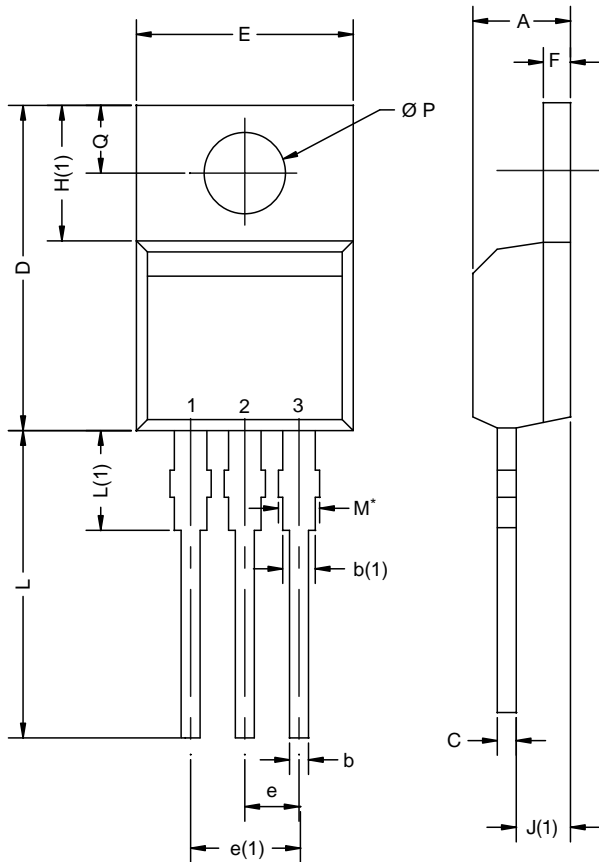
Safe Operating Area, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power, Junction-to-Case

Power, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Normalized Thermal Transient Impedance, Junction-to-Ambient

Normalized Thermal Transient Impedance, Junction-to-Case

TO-220AB

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: X12-0208-Rev. N, 08-Oct-12
DWG: 5471

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion)
Heatsink hole for HVM

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