

## N-Channel 100-V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.092 at $V_{GS} = 10$ V	18

### FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 %  $R_g$  Tested

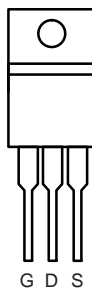


**RoHS**  
COMPLIANT

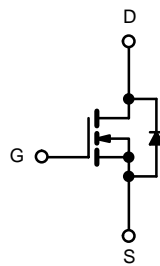
### APPLICATIONS

- Isolated DC/DC Converters

TO-220AB



G D S  
Top View



N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	18	A
		15	
Pulsed Drain Current	$I_{DM}$	68	
Avalanche Current	$I_{AS}$	18	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	200	mJ
Maximum Power Dissipation <sup>b</sup>	$P_D$	105	W
		3.75	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.4	

Notes:

- Package limited.
- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{DS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^{\circ}\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^{\circ}\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	120			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 20\text{ A}$		0.127		$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 125\text{ }^{\circ}\text{C}$		0.110		
		$V_{GS} = 10\text{ V}, I_D = 20\text{ A}, T_J = 175\text{ }^{\circ}\text{C}$		0.121		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 20\text{ A}$	25			S
Dynamic <sup>b</sup>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$		930		pF
Output Capacitance	$C_{oss}$			260		
Reverse Transfer Capacitance	$C_{rss}$			110		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 100\text{ V}, V_{GS} = 10\text{ V}, I_D = 65\text{ A}$			28	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$				4.8	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$				15	
Gate Resistance	$R_g$		0.5	1.7	3.3	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 100\text{ V}, R_L = 1.5\text{ }\Omega$ $I_D \cong 65\text{ A}, V_{GEN} = 10\text{ V}, R_g = 2.5\text{ }\Omega$		8		ns
Rise Time <sup>c</sup>	$t_r$			120		
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			25		
Fall Time <sup>c</sup>	$t_f$			50		
Source-Drain Diode Ratings and Characteristics $T_C = 25\text{ }^{\circ}\text{C}$ <sup>b</sup>						
Continuous Current	$I_S$			18		A
Pulsed Current	$I_{SM}$			68		
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 65\text{ A}, V_{GS} = 0\text{ V}$		1.0	1.5	V
Reverse Recovery Time	$t_{rr}$	$I_F = 50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		130	200	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			8	12	A
Reverse Recovery Charge	$Q_{rr}$			0.52	1.2	$\mu\text{C}$

Notes:

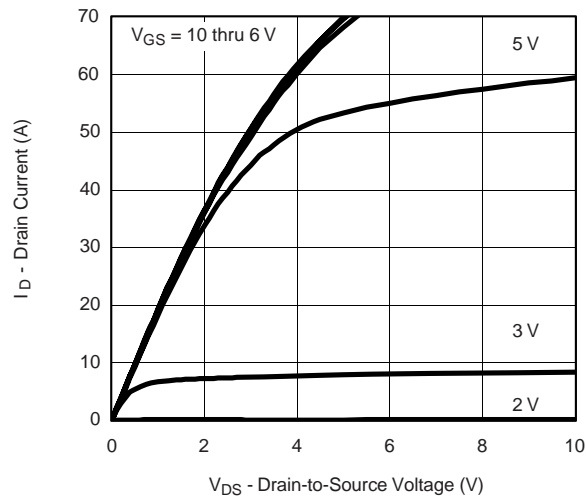
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

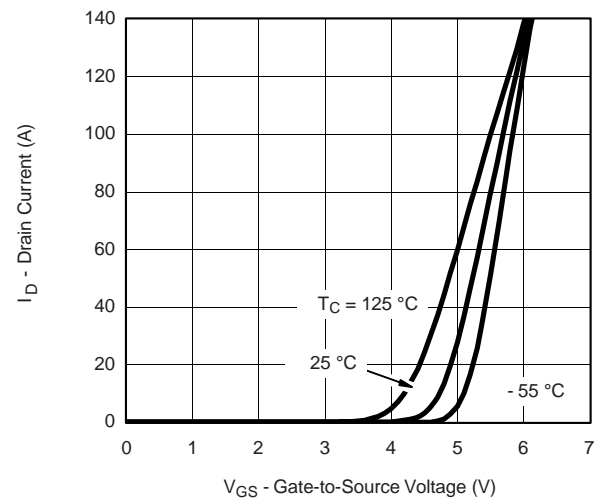
c. Independent of operating temperature.

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.

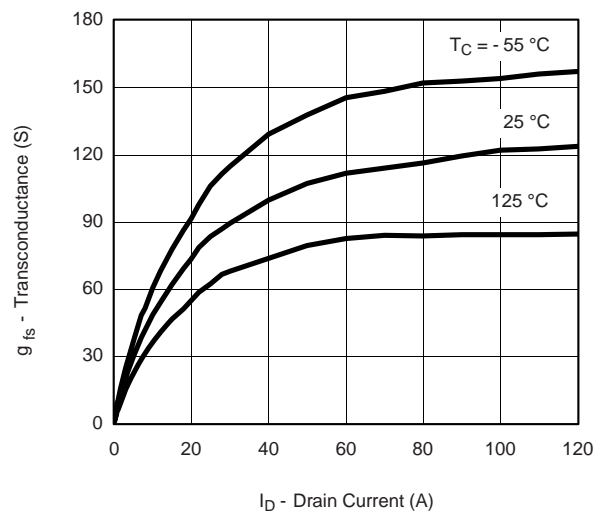
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



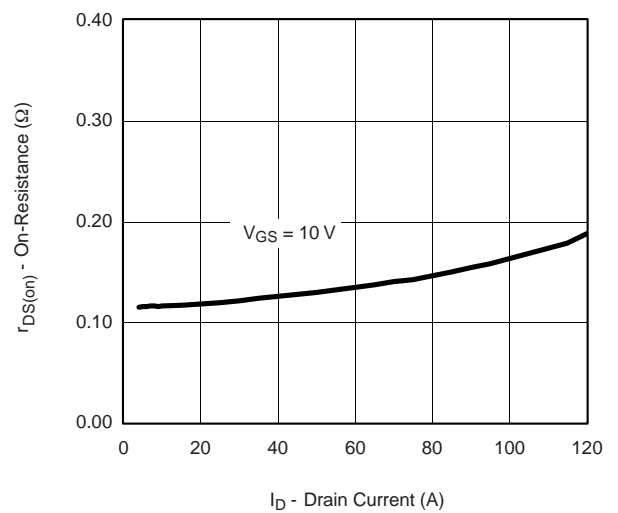
Output Characteristics



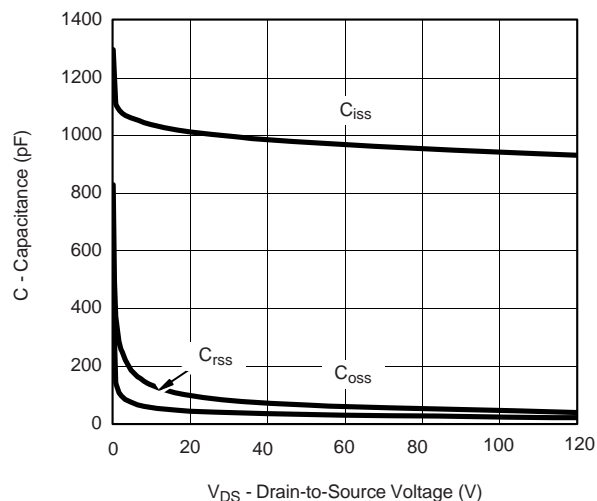
Transfer Characteristics



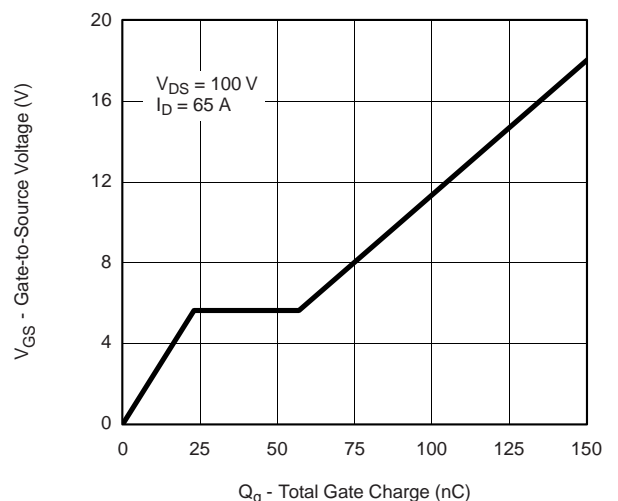
Transconductance



On-Resistance vs. Drain Current

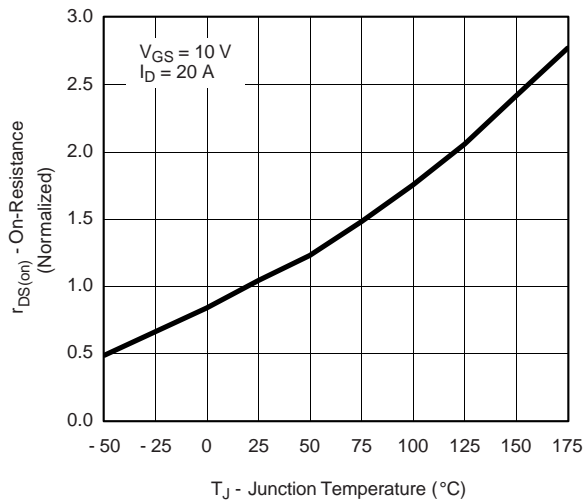


Capacitance

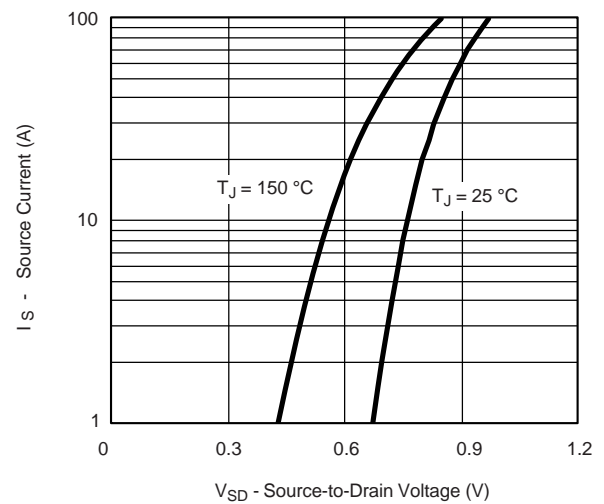


Gate Charge

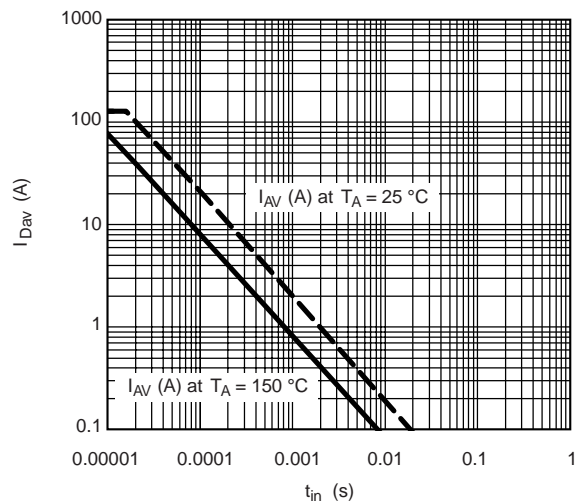
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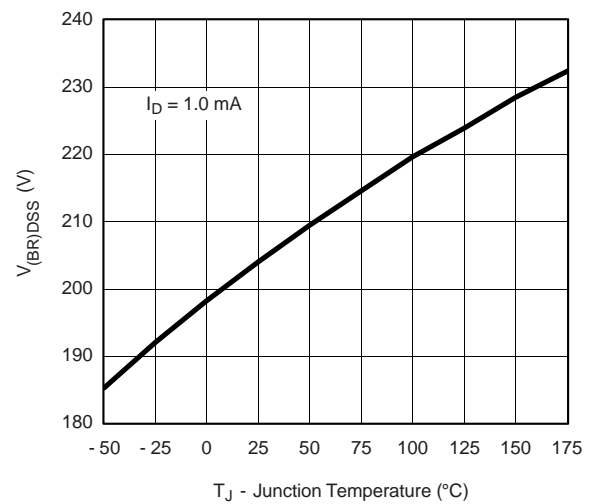
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



Avalanche Current vs. Time



Drain Source Breakdown vs. Junction Temperature

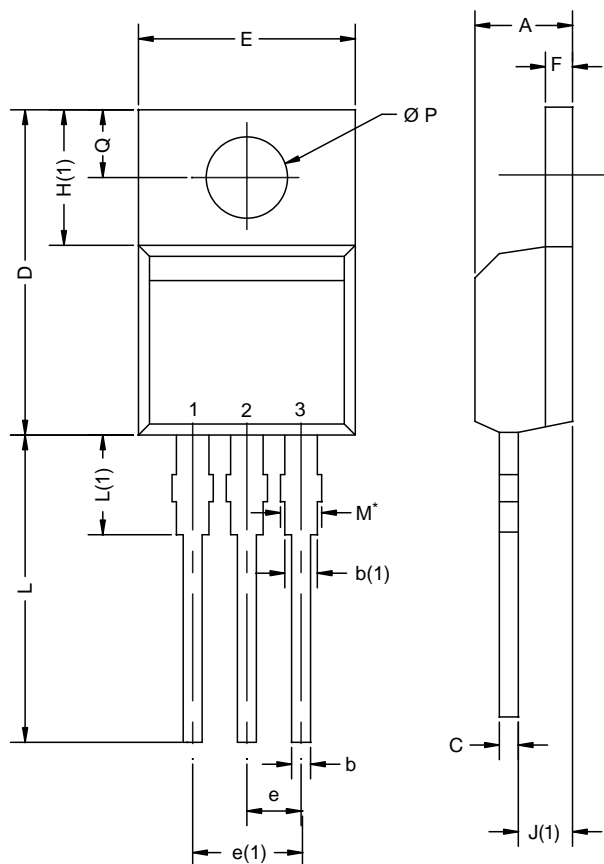
The graph shows the relationship between Drain Current ( $I_D$ ) and Ambient Temperature ( $T_C$ ) for the 2N3866 JFET. The current is constant at approximately 65 mA from 0°C to 25°C, then decreases to 0 mA at 175°C.

$T_C$ - Ambient Temperature ( $^{\circ}\text{C}$ )	$I_D$ - Drain Current (mA)
0	65
25	65
50	60
75	55
100	45
125	35
150	25
175	0

Figure 10 is a line graph showing the relationship between Normalized Effective Transient Thermal Impedance (Y-axis) and Square Wave Pulse Duration (s) (X-axis). The Y-axis is logarithmic, ranging from 0.01 to 2. The X-axis is logarithmic, ranging from  $10^{-4}$  to  $10^{-1}$  seconds. The graph displays several curves corresponding to different duty cycles: 0.5, 0.2, 0.1, 0.05, 0.02, and a Single Pulse. The curves show that the normalized effective transient thermal impedance increases with pulse duration and decreases with increasing duty cycle. For a single pulse, the impedance is the lowest for a given pulse duration, while for a duty cycle of 0.5, it is the highest. All curves converge to a value of 1.0 as the pulse duration increases beyond  $10^{-2}$  seconds.

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## 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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