

# FIR15N10G-VB Datasheet N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY					
V <sub>(BR)DSS</sub> (V)	$R_{DS(on)}(\Omega)$	I <sub>D</sub> (A)			
100	0.127at V <sub>GS</sub> = 10 V	18			

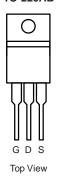
#### **FEATURES**

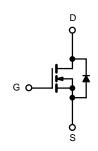
- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R<sub>g</sub> Tested

**APPLICATIONS** 



#### TO-220AB





N-Channel MOSFET

#### • Isolated DC/DC Converters

<b>ABSOLUTE MAXIMUM RATINGS</b> T <sub>C</sub> = 25 °C, unless otherwise noted						
Parameter		Symbol	Limit	Unit		
Drain-Source Voltage		V <sub>DS</sub>	100			
Gate-Source Voltage	V <sub>GS</sub>	± 20	V			
Continuous Drain Current (T <sub>.1</sub> = 175 °C)	T <sub>C</sub> = 25 °C	I-	18	A		
Continuous Diam Current (1) = 173 C)	T <sub>C</sub> = 125 °C		15			
Pulsed Drain Current	I <sub>DM</sub>	68				
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	18			
Single Pulse Avalanche Energy <sup>b</sup>	L = 0.111111	E <sub>AS</sub>	200	mJ		
Mariana Barra Biada atauh	T <sub>C</sub> = 25 °C	В	105	W		
Maximum Power Dissipation <sup>b</sup>	T <sub>A</sub> = 25 °C <sup>d</sup>	P <sub>D</sub>	3.75			
Operating Junction and Storage Temperature Ra	inge	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C		

THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Limit	Unit	
Junction-to-Ambient	PCB Mount (TO-263) <sup>d</sup>	R <sub>thJA</sub>	40	°C/W	
Junction-to-Case (Drain)		R <sub>thJC</sub>	0.4	C/VV	

#### Notes:

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



Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{DS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	100			4 V	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	2		4		
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA	
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V			1	μΑ	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50		
		V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250	1	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, V_{GS} = 10 \text{ V}$	120			Α	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.127			
Drain-Source On-State Resistance <sup>a</sup>	r <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C		0.130		Ω	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 175 °C		0.170			
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A	25			S	
Dynamic <sup>b</sup>							
Input Capacitance	C <sub>iss</sub>			1300		pF	
Output Capacitance	C <sub>oss</sub>	$V_{GS} = 0 \text{ V}, V_{DS} = 25 \text{ V}, f = 1 \text{ MHz}$		260			
Reverse Transfer Capacitance	C <sub>rss</sub>			110			
Total Gate Charge <sup>c</sup>	$Q_g$				28		
Gate-Source Charge <sup>c</sup>	$Q_{gs}$	$V_{DS} = 100 \text{ V}, V_{GS} = 10 \text{ V}, I_D = 65 \text{ A}$			4.8	nC	
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$				15		
Gate Resistance	$R_{g}$		0.5	1.7	3.3	Ω	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>			8			
Rise Time <sup>c</sup>	t <sub>r</sub>	$V_{DD}$ = 100 V, $R_L$ = 1.5 $\Omega$		120		ns	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>	$I_D \cong 65 \text{ A}, V_{GEN} = 10 \text{ V}, R_g = 2.5 \Omega$		25			
Fall Time <sup>c</sup>	t <sub>f</sub>			50			
Source-Drain Diode Ratings and Cha	aracteristics 7	<sub>C</sub> = 25 °C <sup>b</sup>					
Continuous Current	Is			18		^	
Pulsed Current	I <sub>SM</sub>	M		68		Α	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	I <sub>F</sub> = 65 A, V <sub>GS</sub> = 0 V		1.0	1.5	V	
Reverse Recovery Time	t <sub>rr</sub>			130	200	ns	
Peak Reverse Recovery Current	I <sub>RM(REC)</sub>	I <sub>F</sub> = 50 A, di/dt = 100 A/μs		8	12	Α	
Reverse Recovery Charge	Q <sub>rr</sub>			0.52	1.2	μC	

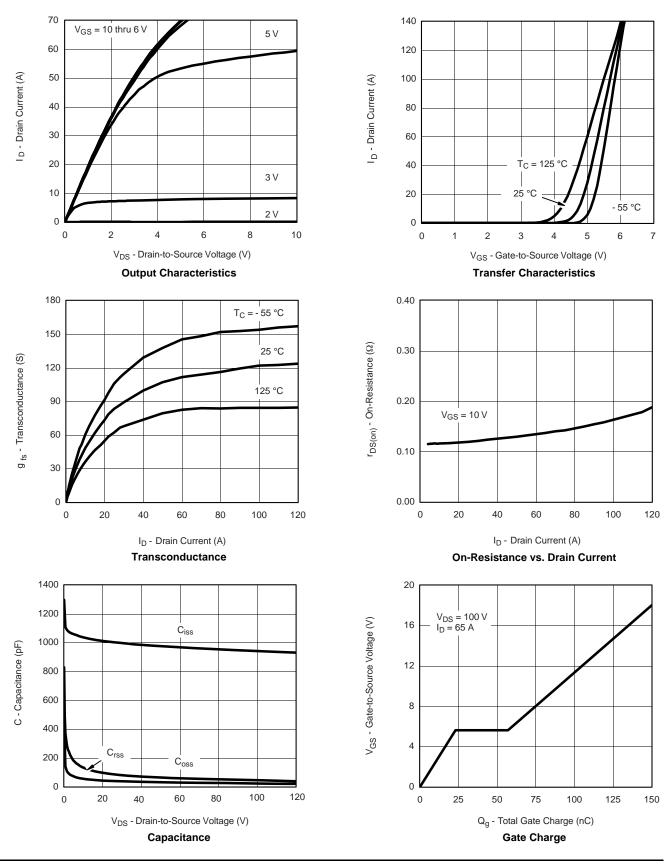
#### Notes

- a. Pulse test; pulse width  $\leq 300~\mu s,$  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.

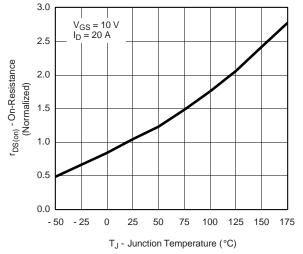


#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

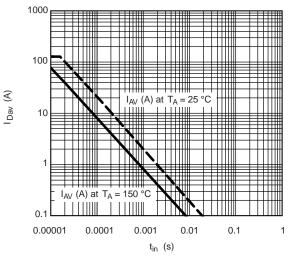




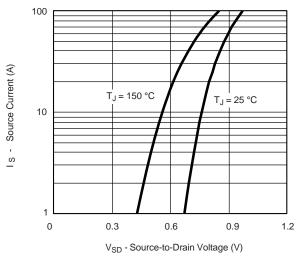
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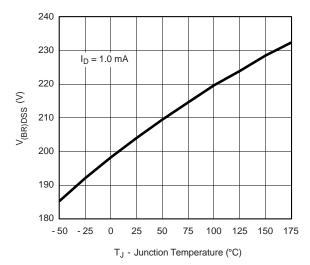
On-Resistance vs. Junction Temperature



Avalanche Current vs. Time



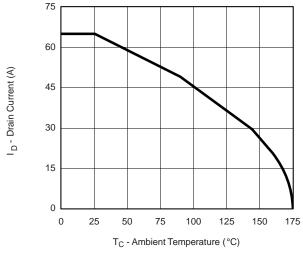
Source-Drain Diode Forward Voltage



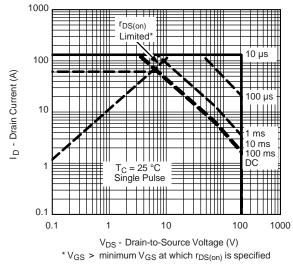
Drain Source Breakdown vs. Junction Temperature



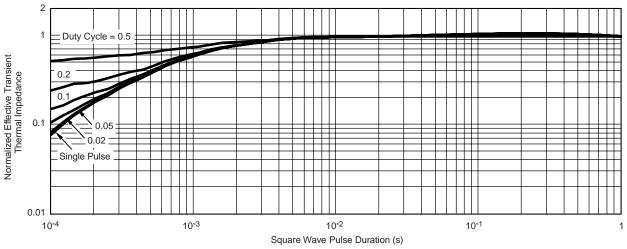
#### THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature



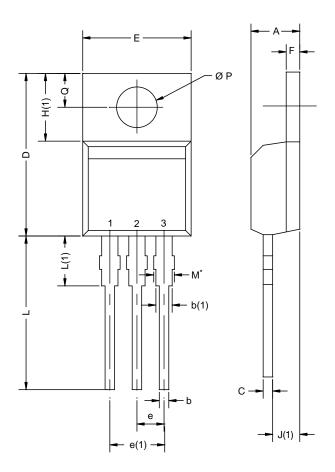
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case



### **TO-220AB**



	MILLIMETERS		INC	HES	
DIM.	MIN.	MAX.	MIN.	MAX.	
А	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	
С	0.36	0.61	0.014	0.024	
D	14.85	15.49	0.585	0.610	
Е	10.04	10.51	0.395	0.414	
е	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	
ØР	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

 $<sup>^{\</sup>star}$  M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM



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