

## F510-VB Datasheet N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY				
V <sub>(BR)DSS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A)		
100	0.127at V <sub>GS</sub> = 10 V	18		

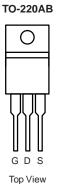
#### FEATURES

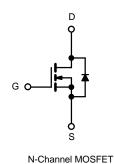
- TrenchFET<sup>®</sup> Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R<sub>g</sub> Tested

#### **APPLICATIONS**

• Isolated DC/DC Converters







Parameter		Symbol	Limit	Unit	
Drain-Source Voltage		V <sub>DS</sub>	100	V	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
Continuous Drain Current ( $T_1 = 175 ^{\circ}C$ )	T <sub>C</sub> = 25 °C	I_	18		
Continuous Drain Current (1) = 175 C)	T <sub>C</sub> = 125 °C	I <sub>D</sub>	15	A	
Pulsed Drain Current	I <sub>DM</sub>	68	A		
Avalanche Current	L = 0.1 mH	I <sub>AS</sub>	18		
Single Pulse Avalanche Energy <sup>b</sup>	L = 0.1 IIIH	E <sub>AS</sub>	200	mJ	
Maria Dia ing ting b	T <sub>C</sub> = 25 °C	P	105	14/	
Maximum Power Dissipation <sup>b</sup>	T <sub>A</sub> = 25 °C <sup>d</sup>	– P <sub>D</sub> –	3.75	W	
Operating Junction and Storage Temperature Range		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).

<b>SPECIFICATIONS</b> $T_J = 25^{\circ}$	C, unless o	therwise noted					
Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit	
Static							
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	$V_{DS} = 0 V, I_{D} = 250 \mu A$	100			V	
Gate-Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \ \mu A$	2		4	v	
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA	
		$V_{DS} = 100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			1	μA	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	$V_{DS} = 100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 125 ^{\circ}\text{C}$			50		
		$V_{DS} = 100 \text{ V}, \text{ V}_{GS} = 0 \text{ V}, \text{ T}_{J} = 175 ^{\circ}\text{C}$			250		
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \ge 5 \text{ V}, \text{ V}_{GS} = 10 \text{ V}$	120			А	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.127		1	
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>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 25 V, f = 1 MHz		1300		pF	
Output Capacitance	C <sub>oss</sub>			260			
Reverse Transfer Capacitance	C <sub>rss</sub>			110			
Total Gate Charge <sup>c</sup>	Qg				28	nC	
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>	V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 65 A			4.8		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>				15		
Gate Resistance	Rg		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 <sub>L</sub> = 1.5 $\Omega$		120		20	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>	$\text{I}_\text{D}\cong$ 65 A, $\text{V}_\text{GEN}$ = 10 V, $\text{R}_\text{g}$ = 2.5 $\Omega$		25		ns	
Fall Time <sup>c</sup>	t <sub>f</sub>			50			
Source-Drain Diode Ratings and Ch	aracteristics 7	$\Gamma_{\rm C} = 25 \ ^{\circ}{\rm C}^{\rm b}$					
Continuous Current	۱ <sub>S</sub>			18			
Pulsed Current	I <sub>SM</sub>			68		A	
Forward Voltage <sup>a</sup>	V <sub>SD</sub>	$I_{F} = 65 \text{ A}, \text{ V}_{GS} = 0 \text{ V}$		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	А	
Reverse Recovery Charge	Q <sub>rr</sub>			0.52	1.2	μC	

Notes:

a. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 %.

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

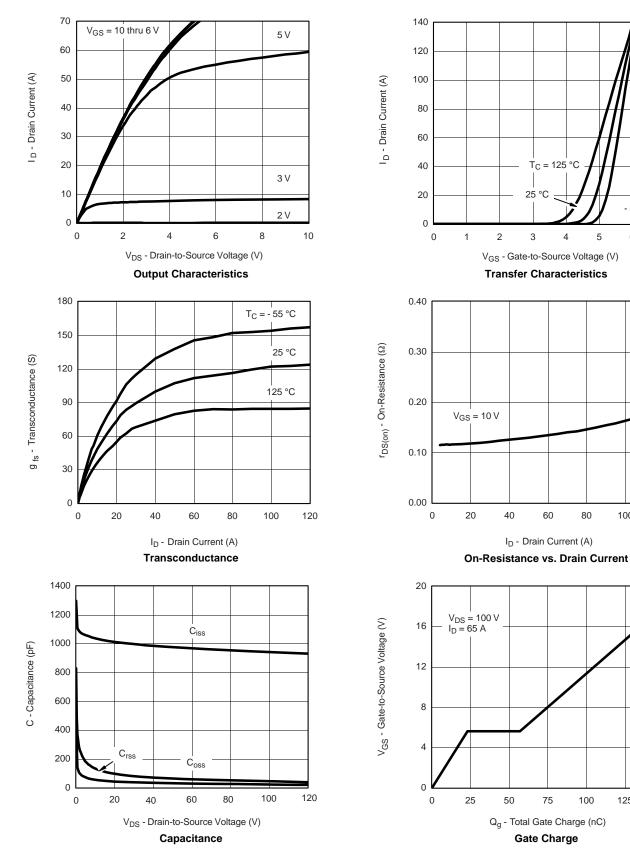
c. Independent of operating temperature.

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.

Bsemi



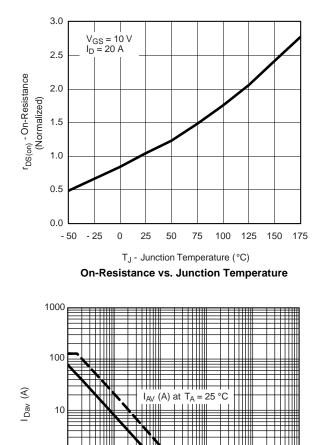
- 55 °C

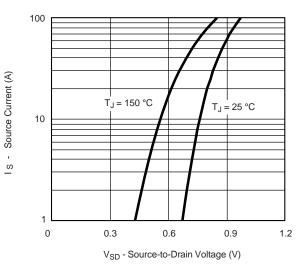


#### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted

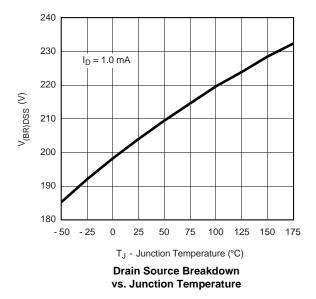


### TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted





Source-Drain Diode Forward Voltage



1

0.1

0.00001

 $I_{AV}$  (A) at  $T_A = 150$  °C

0.0001

0.001

t<sub>in</sub> (s)

Avalanche Current vs. Time

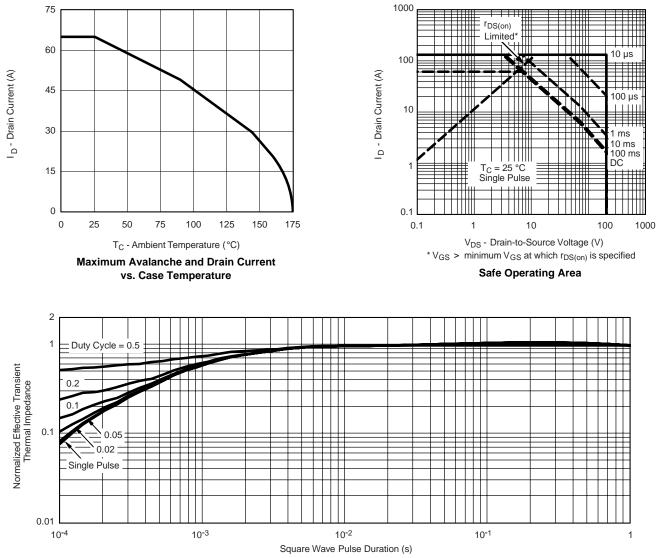
0.01

0.1

1



#### THERMAL RATINGS



Normalized Thermal Transient Impedance, Junction-to-Case



## **TO-220AB**



	MILLIN	IETERS	INCHES		
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	
E	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	
ØΡ	3.54	3.94	0.139	0.155	
Q	2.60	3.00	0.102	0.118	

#### Notes

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



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