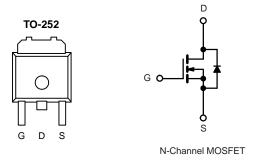


## LR3815-VB Datasheet

# N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY				
V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)	I <sub>D</sub> (A) <sup>a</sup>		
60	0.010 at V <sub>GS</sub> = 10 V	58		
00	0.013 at V <sub>GS</sub> = 4.5 V	56		



#### **FEATURES**

- 175 °C Junction Temperature
- Trench Power MOSFET
- Material categorization:



ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub> =	25 °C, unless othe	rwise noted)			
Parameter		Symbol	Limit	Unit	
Gate-Source Voltage		V <sub>GS</sub>	± 20	V	
Continuous Drain Current $(T_1 = 175 \text{ °C})^b$	T <sub>C</sub> = 25 °C	1-	58		
Commodes Drain Current $(T_j = 175 \text{ C})^2$	T <sub>C</sub> = 100 °C	I <sub>D</sub>	48 <sup>a</sup>		
Pulsed Drain Current	I <sub>DM</sub>	100	A		
Continuous Source Current (Diode Conduction)		۱ <sub>S</sub>	50 <sup>a</sup>	-	
Avalanche Current	I <sub>AS</sub>	50			
Single Avalanche Energy (Duty Cycle $\leq$ 1 %)	L = 0.1 mH	E <sub>AS</sub>	125	mJ	
Maximum Power Dissipation	T <sub>C</sub> = 25 °C	P <sub>D</sub>	136	w	
	T <sub>A</sub> = 25 °C	'D	3 <sup>b</sup> , 8.3 <sup>b, c</sup>	vv	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C	

THERMAL RESISTANCE RATINGS						
Parameter		Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient <sup>a</sup>	$t \le 10 \text{ sec}$	R <sub>thJA</sub>	15	18		
Maximum Junction-to-Ambient*	Steady State		40	50	°C/W	
Maximum Junction-to-Case		R <sub>thJC</sub>	0.85	1.1		

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. t  $\leq$  10 s.



Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit	
Static	• • • • • • • • • • • • • • • • • • • •			Typ.		•	
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 µA	60				
Gate Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_D = 250 \mu A$	1	2	3	V	
Gate-Body Leakage	I <sub>GSS</sub>	$V_{DS} = 0 V, V_{GS} = \pm 20 V$			± 100	nA	
		$V_{DS} = 60 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50		
-		V <sub>DS</sub> = 60 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250		
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	$V_{DS} = 5 V, V_{GS} = 10 V$	60			А	
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A	0.010				
	Р	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C		0.016			
Drain-Source On-State Resistance <sup>b</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 175 °C		0.020		Ω	
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		0.013			
Forward Transconductance <sup>b</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		60		S	
Dynamic	•			•			
Input Capacitance	C <sub>iss</sub>			2650			
Output Capacitance	C <sub>oss</sub>	$V_{GS}$ = 0 V, $V_{DS}$ = 25 V, f = 1 MHz		470		pF	
Reverse Transfer Capacitance	C <sub>rss</sub>			225			
Total Gate Charge <sup>c</sup>	Qg			47	70		
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>	$V_{DS}$ = 30 V, $V_{GS}$ = 10 V, $I_D$ = 50 A		10		nC	
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			12		1	
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>			10	20		
Rise Time <sup>c</sup>	t <sub>r</sub>	$V_{DD}$ = 30 V, $R_{L}$ = 0.6 $\Omega$		15	25	ns	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>	$\text{I}_\text{D}\cong$ 50 A, $\text{V}_\text{GEN}$ = 10 V, $\text{R}_\text{g}$ = 2.5 $\Omega$		35	50		
Fall Time <sup>c</sup>	t <sub>f</sub>			20	30		
Source-Drain Diode Ratings and Cha	aracteristics (	T <sub>C</sub> = 25 °C)					
Pulsed Current	I <sub>SM</sub>				60	А	
Diode Forward Voltage	V <sub>SD</sub>	I <sub>F</sub> = 20 A, V <sub>GS</sub> = 0 V		1	1.5	V	
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs		45	100	ns	

Notes:

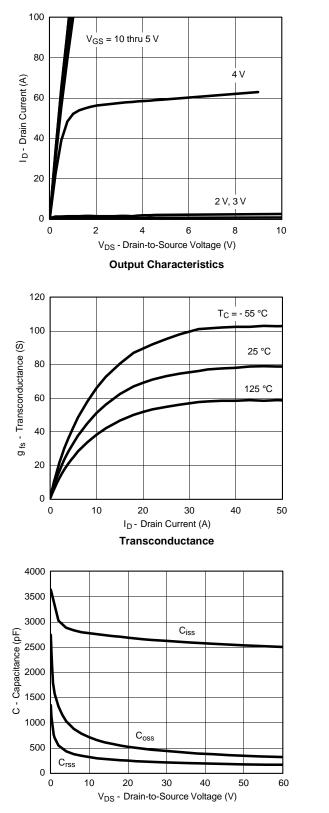
a. For design aid only; not subject to production testing.

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

c. Independent of operating temperature.

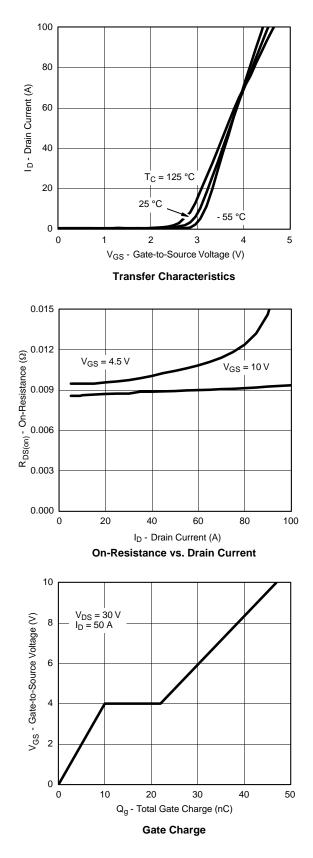
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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



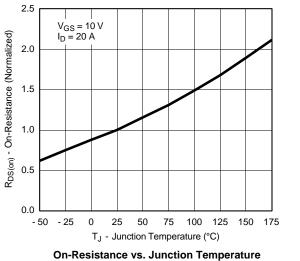


#### TYPICAL CHARACTERISTICS (25 °C unless noted)

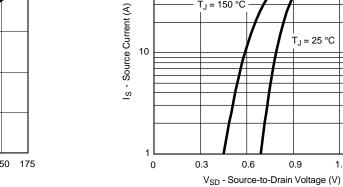
Capacitance







### TYPICAL CHARACTERISTICS (25 °C unless noted)



100

10

Source-Drain Diode Forward Voltage

. T<sub>J</sub> = 25 °C

0.9

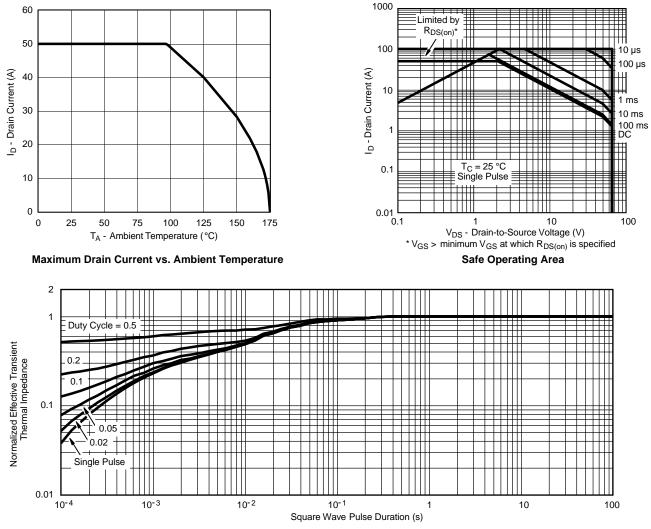
1.2

1.5

. T<sub>J</sub> = 150 °C



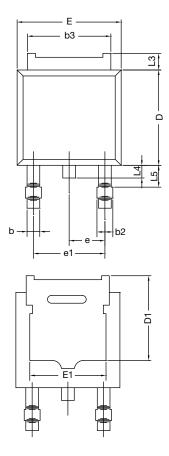
#### **THERMAL RATINGS**

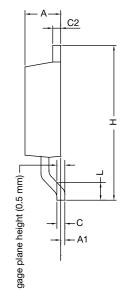


Normalized Thermal Transient Impedance, Junction-to-Case



## **TO-252AA CASE OUTLINE**





	MILLIN	IETERS	INC	INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.	
А	2.18	2.38	0.086	0.094	
A1	-	0.127	-	0.005	
b	0.64	0.88	0.025	0.035	
b2	0.76	1.14	0.030	0.045	
b3	4.95	5.46	0.195	0.215	
С	0.46	0.61	0.018	0.024	
C2	0.46	0.89	0.018	0.035	
D	5.97	6.22	0.235	0.245	
D1	5.21	-	0.205	-	
Е	6.35	6.73	0.250	0.265	
E1	4.32	-	0.170	-	
Н	9.40	10.41	0.370	0.410	
е	2.28	BSC	0.090 BSC		
e1	4.56	BSC	0.180 BSC		
L	1.40	1.78	0.055	0.070	
L3	0.89	1.27	0.035	0.050	
L4	-	1.02	-	0.040	
L5	1.14	1.52	0.045	0.060	
ECN: X12- DWG: 534	0247-Rev. M, 7	24-Dec-12			

#### Note

• Dimension L3 is for reference only.



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