FQB46N15-VB Datasheet

N-Channel 150 V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)
150	0.035 at V_{GS} = 10 V	45
	0.042 at V_{GS} = 7.5 V	42

FEATURES

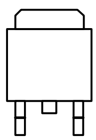
- Trench Power MOSFETs
- 175 °C Junction Temperature
- New Low Thermal Resistance Package
- PWM Optimized
- Compliant to RoHS Directive 2002/95/EC

RoHS COMPLIANT

APPLICATIONS

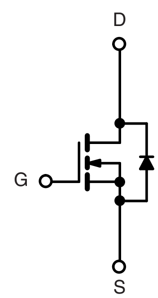
- Primary Side Switch

TO-263



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}	150	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	45	A
	T_C = 125 °C		31	
Pulsed Drain Current		I_{DM}	140	
Avalanche Current		I_{AR}	50	
Repetitive Avalanche Energy[a]	L = 0.1 mH	E_{AR}	80	mJ
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	160[b]	W
	T_A = 25 °C[c]		3.7	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	**Symbol**	**Limit**	**Unit**
Junction-to-Ambient (PCB Mount TO-263[c])	R_{thJA}	40	°C/W
Junction-to-Case (Drain)	R_{thJC}	0.9	

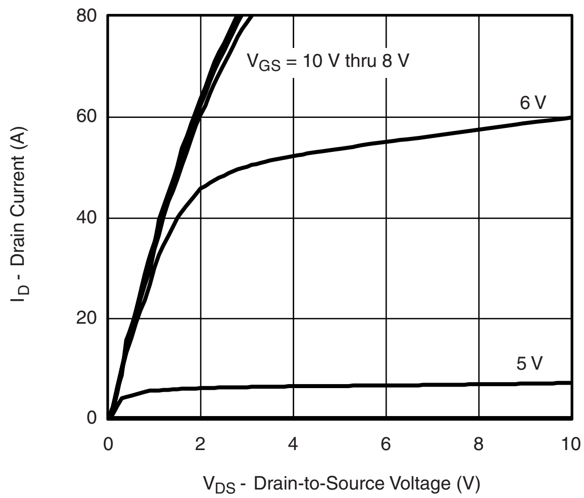
Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When Mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{DS} = 0 V, I_D = 250 µA	150			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	4		6	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 150 V, V_{GS} = 0 V			1	µA
		V_{DS} = 120 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 120 V, V_{GS} = 0 V, T_J = 175 °C			250	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq$ 5 V, V_{GS} = 10 V	80			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 15 A		0.035		Ω
		V_{GS}= 7.5 V, I_D = 10 A		0.042		
		V_{GS} = 10 V, I_D = 15 A, T_J = 125 °C		0.060		
		V_{GS} = 10 V, I_D = 15 A, T_J = 175 °C		0.080		
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 15 A	10			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		2200		pF
Output Capacitance	C_{oss}			290		
Reverse Transfer Capacitance	C_{rss}			190		
Gate Resistance	R_g			2		Ω
Total Gate Charge[c]	Q_g	V_{DS} = 75 V, V_{GS} = 10 V, I_D = 40 A		38	60	nC
Gate-Source Charge[c]	Q_{gs}			13		
Gate-Drain Charge[c]	Q_{gd}			13		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 75 V, R_L = 1.80 Ω $I_D \cong$ 40 A, V_{GEN} = 10 V, R_g = 2.5 Ω		15	25	ns
Rise Time[c]	t_r			130	200	
Turn-Off Delay Time[c]	$t_{d(off)}$			30	45	
Fall Time[c]	t_f			90	140	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				40	A
Pulsed Current	I_{SM}				80	
Forward Voltage[a]	V_{SD}	I_F = 40 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 40 A, dI/dt = 100 A/µs		100	150	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			5	8	A
Reverse Recovery Charge	Q_{rr}			0.25	0.6	µC

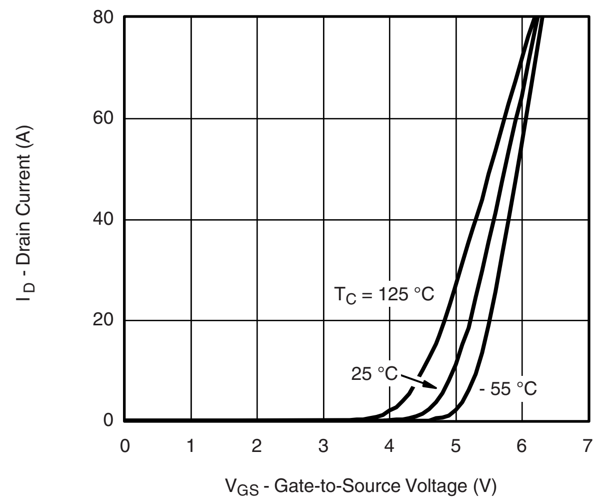
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

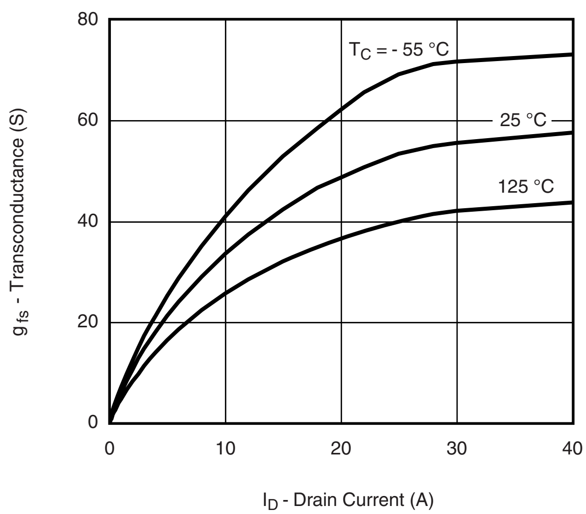
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



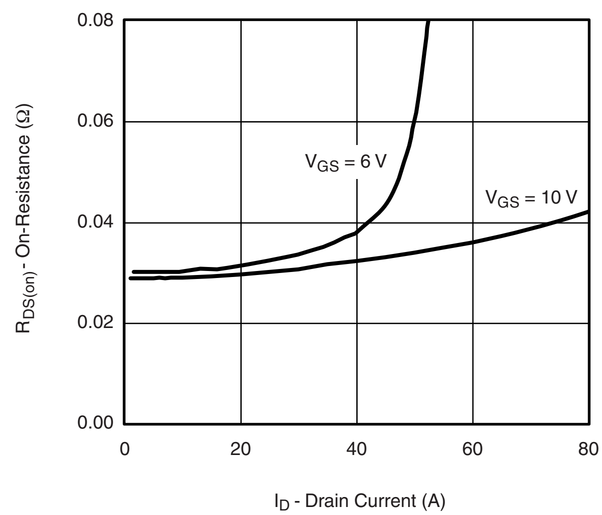
Output Characteristics



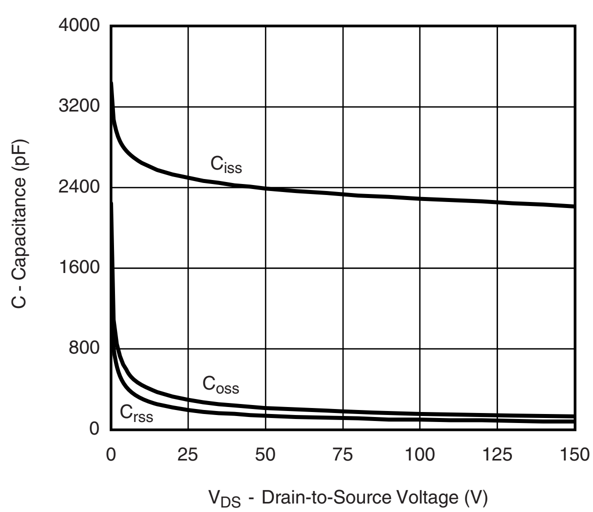
Transfer Characteristics



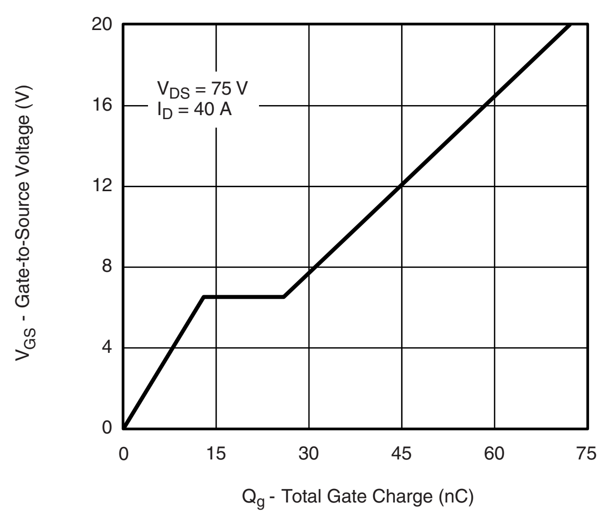
Transconductance



On-Resistance vs. Drain Current

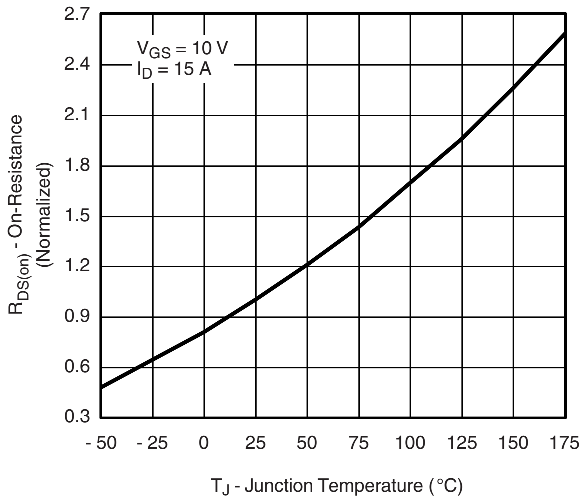


Capacitance

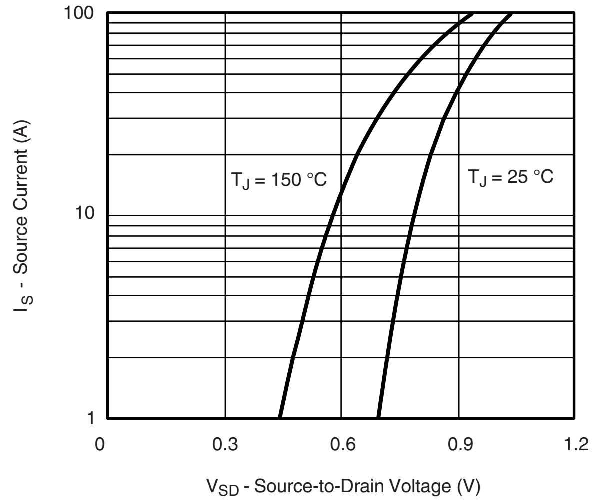


Gate Charge

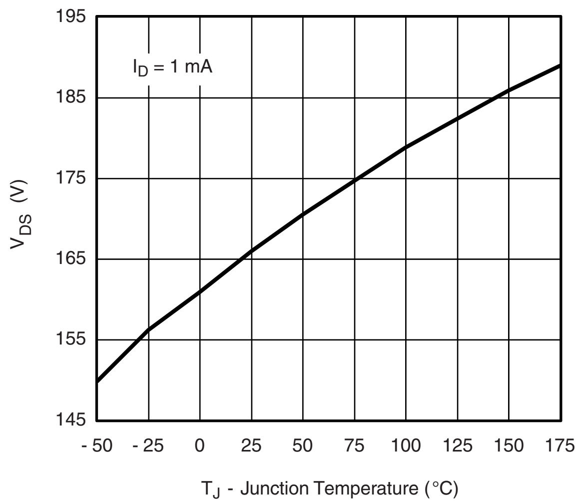
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



On-Resistance vs. Junction Temperature

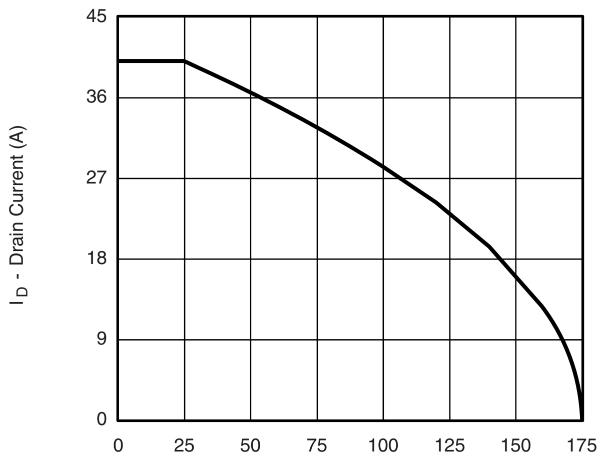


Source-Drain Diode Forward Voltage

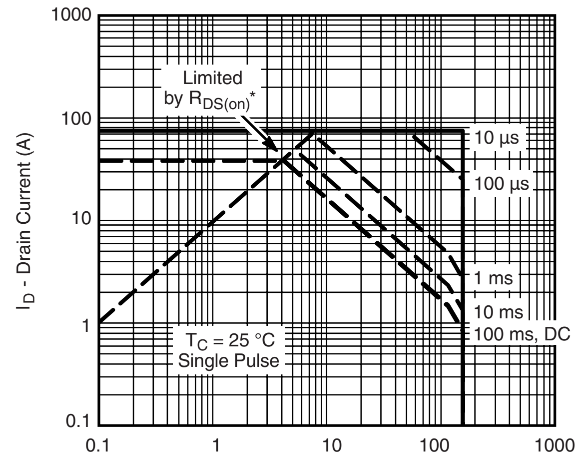


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS

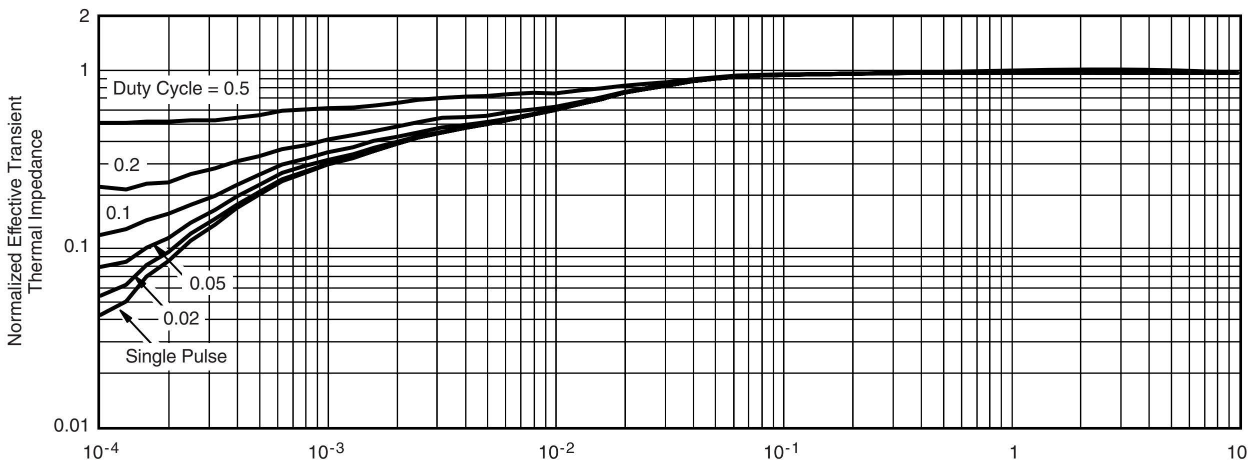


Maximum Avalanche and Drain Current vs. Case Temperature



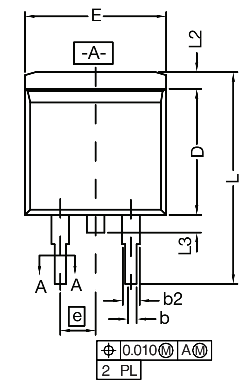
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified

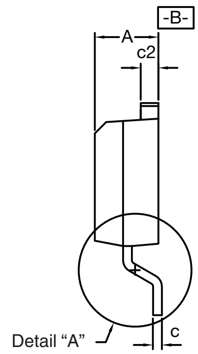
Safe Operating Area

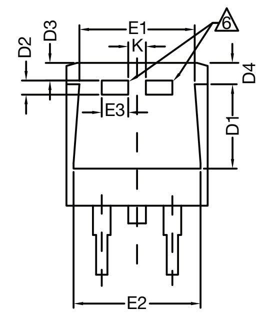


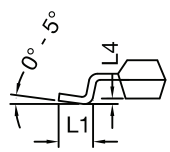
Normalized Thermal Transient Impedance, Junction-to-Case

TO-263 (D^2PAK): 3-LEAD

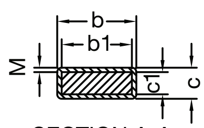








DETAIL A (ROTATED 90°)



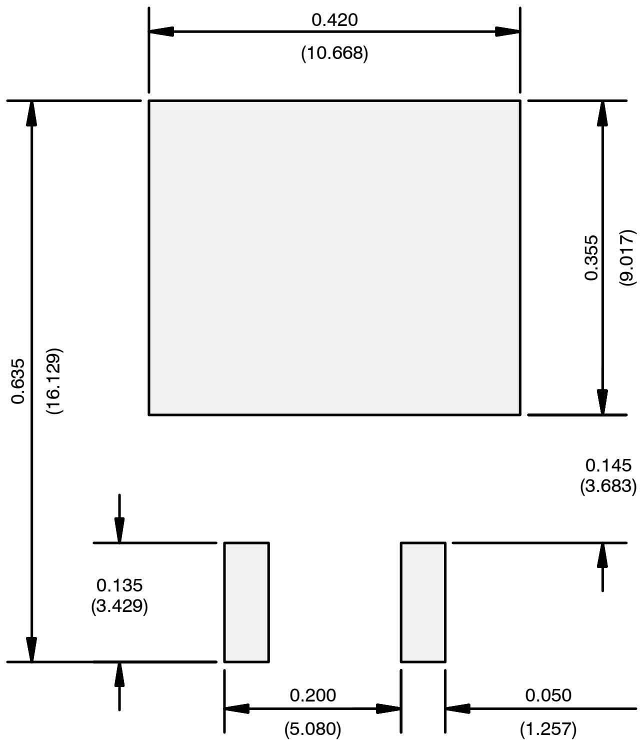
SECTION A-A

DIM.		INCHES		MILLIMETERS	
		MIN.	MAX.	MIN.	MAX.
A		0.160	0.190	4.064	4.826
b		0.020	0.039	0.508	0.990
b1		0.020	0.035	0.508	0.889
b2		0.045	0.055	1.143	1.397
c*	Thin lead	0.013	0.018	0.330	0.457
	Thick lead	0.023	0.028	0.584	0.711
c1	Thin lead	0.013	0.017	0.330	0.431
	Thick lead	0.023	0.027	0.584	0.685
c2		0.045	0.055	1.143	1.397
D		0.340	0.380	8.636	9.652
D1		0.220	0.240	5.588	6.096
D2		0.038	0.042	0.965	1.067
D3		0.045	0.055	1.143	1.397
D4		0.044	0.052	1.118	1.321
E		0.380	0.410	9.652	10.414
E1		0.245	-	6.223	-
E2		0.355	0.375	9.017	9.525
E3		0.072	0.078	1.829	1.981
e		0.100 BSC		2.54 BSC	
K		0.045	0.055	1.143	1.397
L		0.575	0.625	14.605	15.875
L1		0.090	0.110	2.286	2.794
L2		0.040	0.055	1.016	1.397
L3		0.050	0.070	1.270	1.778
L4		0.010 BSC		0.254 BSC	
M		-	0.002	-	0.050
ECN: T13-0707-Rev. K, 30-Sep-13 DWG: 5843					

Notes

1. Plane B includes maximum features of heat sink tab and plastic.
2. No more than 25 % of L1 can fall above seating plane by max. 8 mils.
3. Pin-to-pin coplanarity max. 4 mils.
4. *: Thin lead is for SUB, SYB.
   Thick lead is for SUM, SYM, SQM.
5. Use inches as the primary measurement.
6. This feature is for thick lead.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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