

VBQF2658 Datasheet

P-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^d	Q _g (Typ)
- 60	0.060 at V _{GS} = - 10 V	- 11	36
	0.075 at V _{GS} = - 4.5 V	- 8	

FEATURES

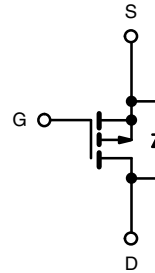
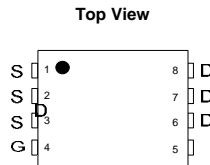
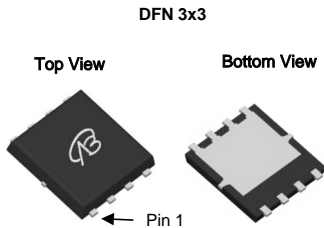
- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET[®] Power MOSFET
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



RoHS
COMPLIANT
HALOGEN
FREE
Available

APPLICATIONS

- High Side Switch for Full Bridge Converter
- DC/DC Converter for LCD Display



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise note)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	- 60	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 11	A
		T _C = 100 °C	- 8.8	
Pulsed Drain Current	I _{DM}	- 33		
Avalanche Current, Single Pulse	I _{AS}	- 22		
Repetitive Avalanche Energy, Single Pulse ^a	E _{AS}	24.2	mJ	
Power Dissipation	P _D	T _C = 25 °C	38.5 ^c	W
		T _A = 25 °C	2.3 ^{b, c}	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^b	R _{thJA}	t ≤ 10 s	17	21	°C/W
		Steady State	45	55	
Maximum Junction-to-Case	R _{thJC}	2.7	3.25		

Notes:

- a. Duty cycle ≤ 1 %.
- b. When mounted on 1" square PCB (FR-4 material).
- c. See SOA curve for voltage derating.
- d. Based up on T_C = 25 °C.

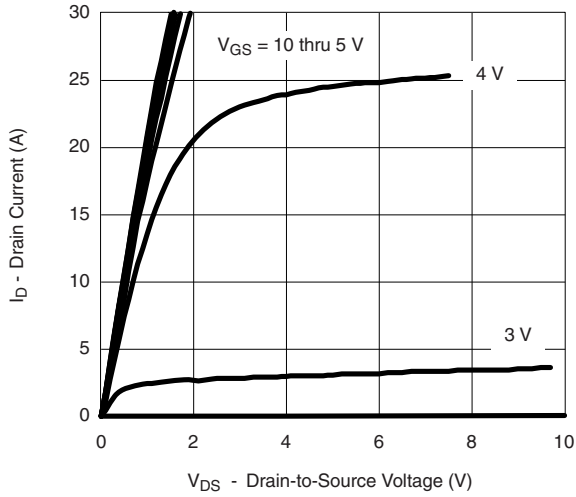
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise note)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 60			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	V
Gate-Body Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			- 1	μA
		$V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -48\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			- 125	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 20			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		0.060		Ω
		$V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.090		
		$V_{GS} = -10\text{ V}, I_D = -10\text{ A}, T_J = 150\text{ }^\circ\text{C}$		0.102		
		$V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$		0.075		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -10\text{ A}$		22		S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = -25\text{ V}, f = 1\text{ MHz}$		1600		pF
Output Capacitance	C_{oss}			130		
Reverse Transfer Capacitance	C_{rss}			90		
Total Gate Charge ^c	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -10\text{ A}$		36	40	nC
Gate-Source Charge ^c	Q_{gs}			4.5		
Gate-Drain Charge ^c	Q_{gd}			7		
Gate Resistance	R_g	$f = 1\text{ MHz}$		7		Ω
Turn-On Delay Time ^c	$t_{d(on)}$	$V_{DD} = -30\text{ V}, R_L = 3\text{ }\Omega$ $I_D \cong -19\text{ A}, V_{GEN} = -10\text{ V}, R_g = 2.5\text{ }\Omega$		8	15	ns
Rise Time ^c	t_r			9	15	
Turn-Off Delay Time ^c	$t_{d(off)}$			65	100	
Fall Time ^c	t_f			30	45	
Drain-Source Body Diode and Characteristics ($T_C = 25\text{ }^\circ\text{C}$) ^b						
Continuous Current	I_S				- 11	A
Pulsed Current	I_{SM}				- 33	
Forward Voltage ^a	V_{SD}	$I_F = -19\text{ A}, V_{GS} = 0\text{ V}$		- 1	- 1.5	V
Reverse Recovery Time	t_{rr}	$I_F = -19\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		41	61	ns

Notes:

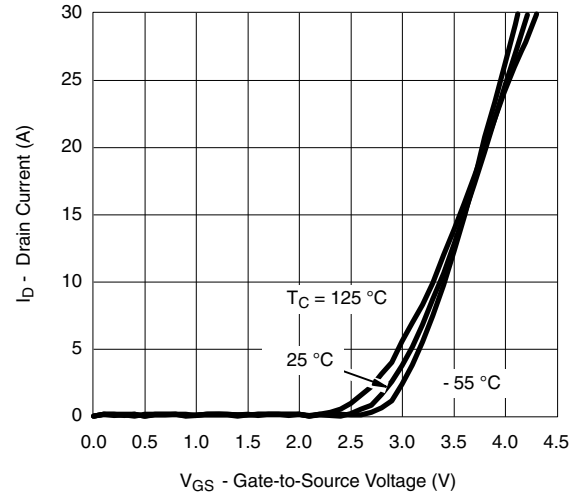
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

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.

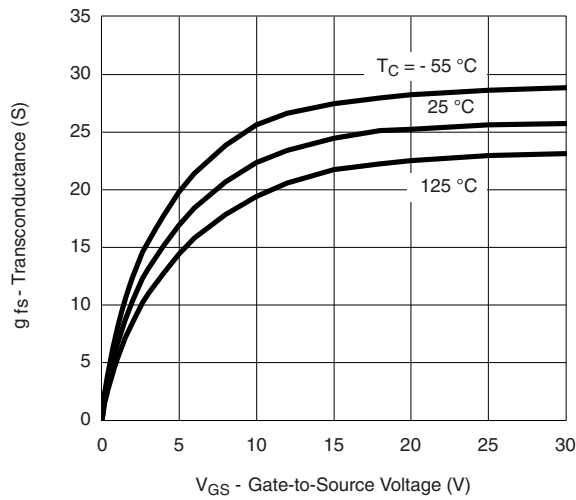
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



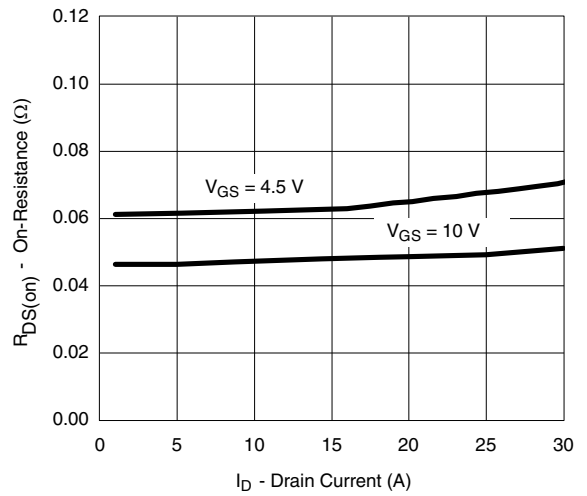
Output Characteristics



Transfer Characteristics



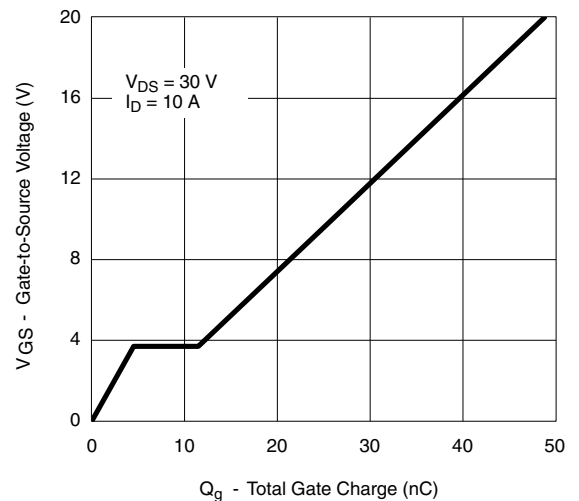
Transconductance



On-Resistance vs. Drain Current

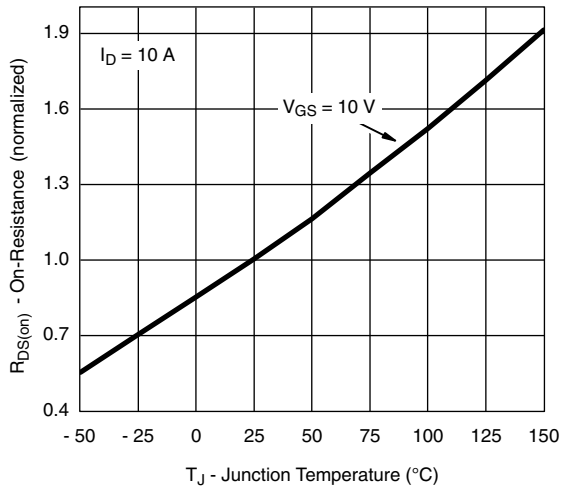


Capacitance

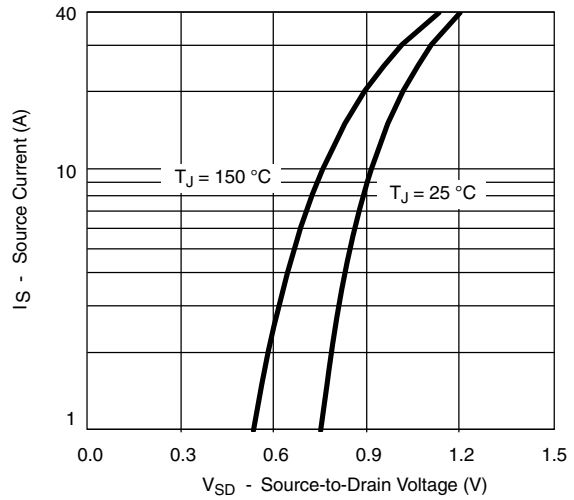


Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

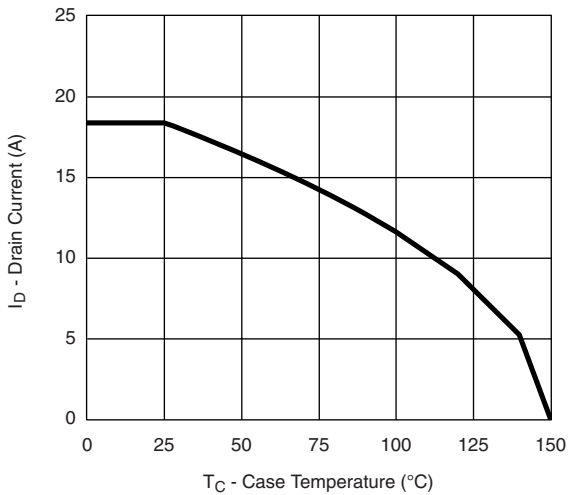


On-Resistance vs. Junction Temperature

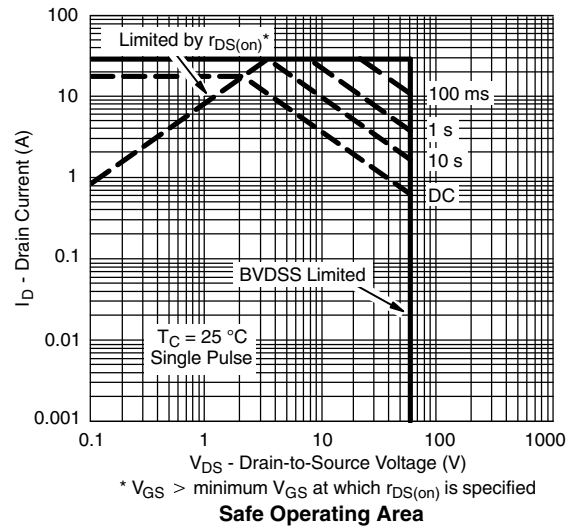


Source-Drain Diode Forward Voltage

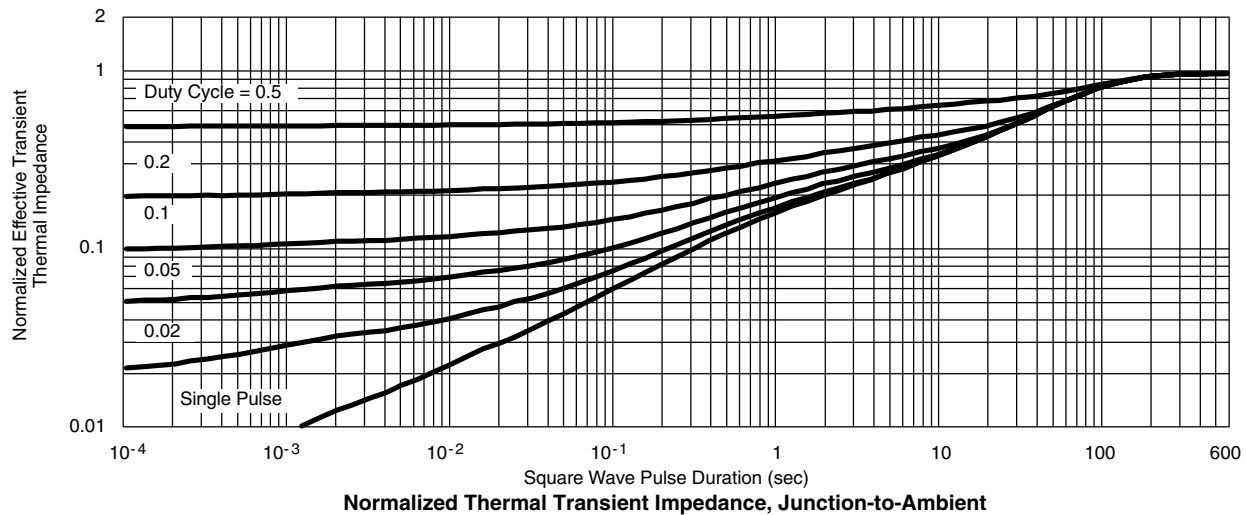
THERMAL RATINGS



Maximum Drain Current vs. Case Temperature

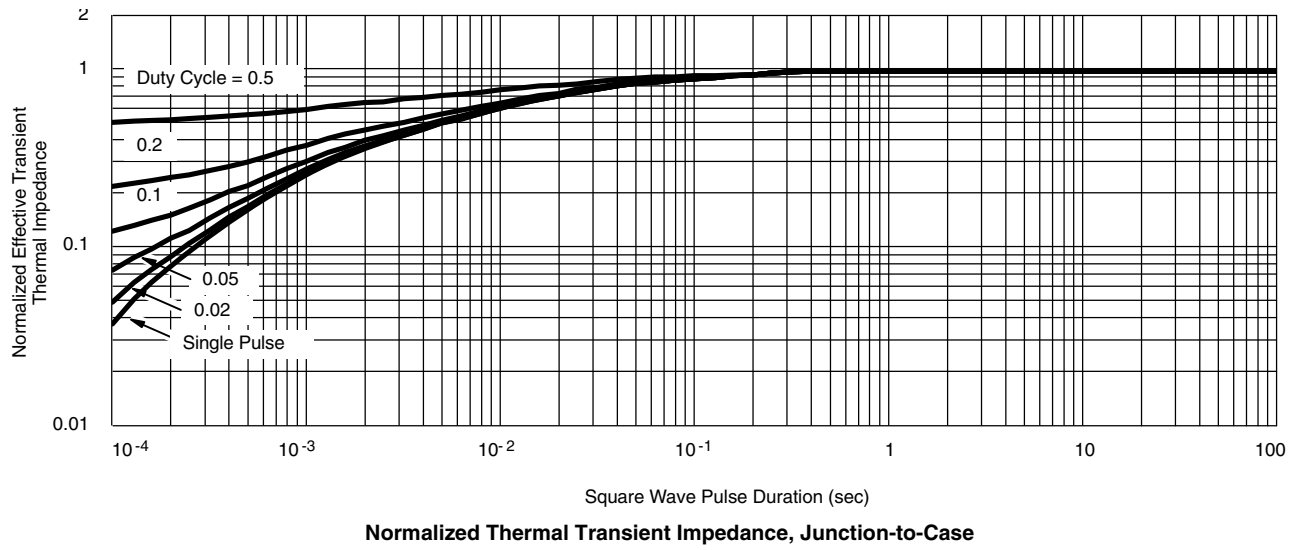


Safe Operating Area
* $V_{GS} >$ minimum V_{GS} at which $r_{DS(on)}$ is specified

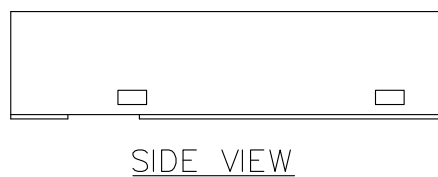
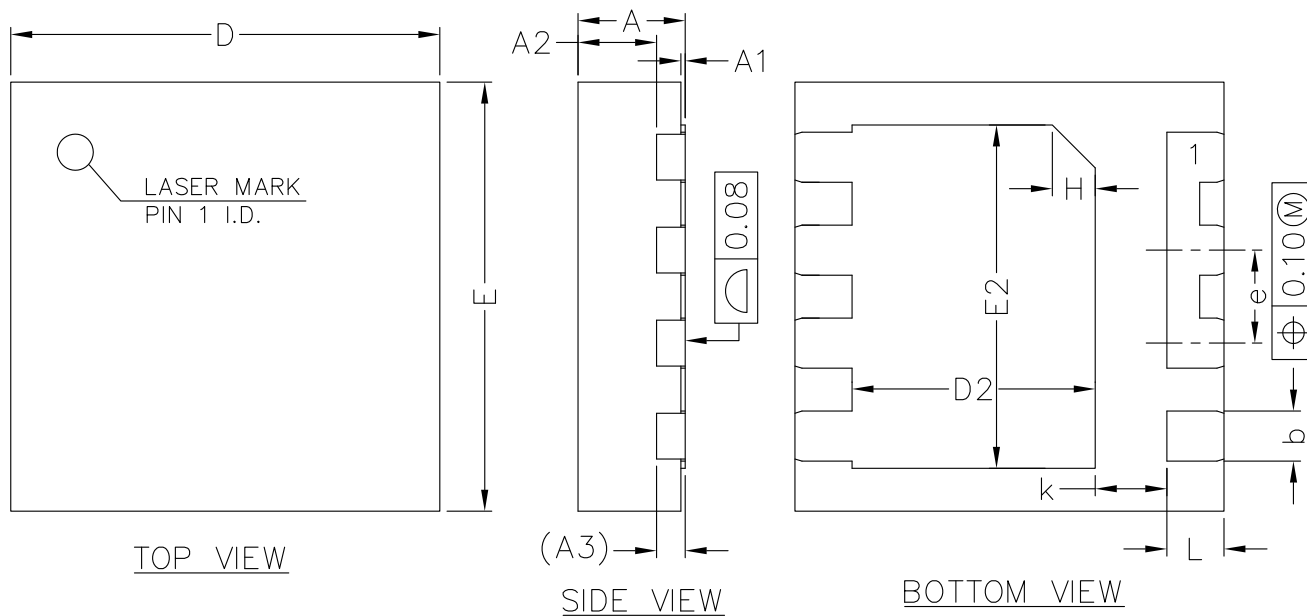


Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS



DFN3x3



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.50	0.55	0.60
A3	0.20REF		
b	0.30	0.35	0.40
D	2.90	3.00	3.10
E	2.90	3.00	3.10
D2	1.60	1.70	1.80
E2	2.30	2.40	2.50
e	0.55	0.65	0.75
K	0.40	0.50	0.60
L	0.35	0.40	0.45

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