

VBQF2610N 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	0.120 at $V_{GS} = - 10$ V	- 5	38
	0.140 at $V_{GS} = - 4.5$ V	- 4	

FEATURES

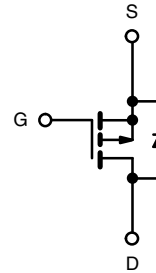
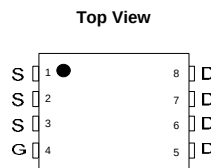
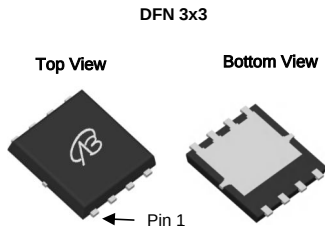
- Halogen-free According to IEC 61249-2-21 Definition
- Trench Power MOSFET
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC



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)	$T_C = 25$ °C	I_D - 5	A
	$T_C = 100$ °C	- 4	
Pulsed Drain Current	I_{DM}	- 15	
Avalanche Current, Single Pulse	I_{AS}	- 22	
Repetitive Avalanche Energy, Single Pulse ^a	E_{AS}	24.2	mJ
Power Dissipation	$T_C = 25$ °C	P_D 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}	17	21	°C/W
		45	55	
Maximum Junction-to-Case	R_{thJC}	2.7	3.25	

Notes:

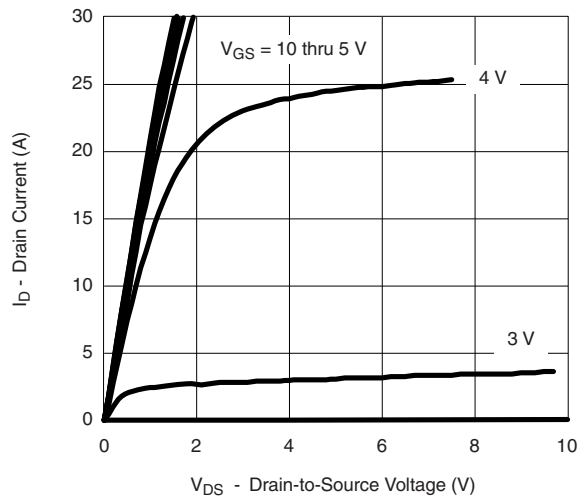
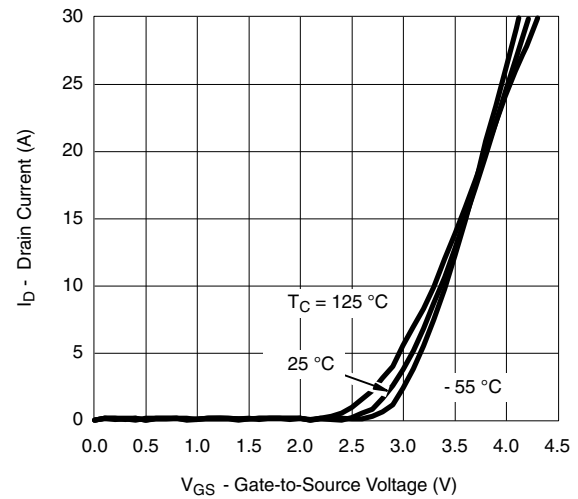
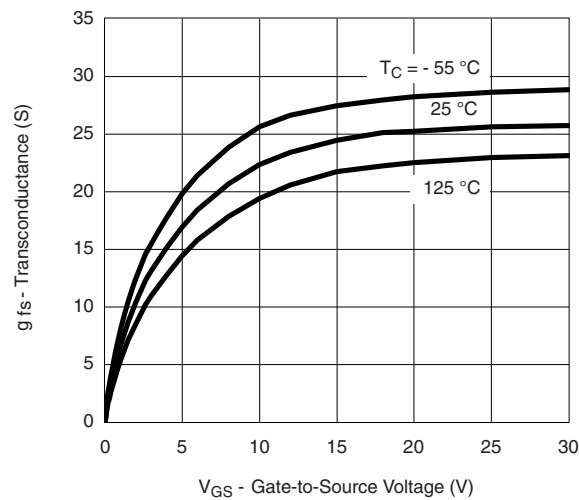
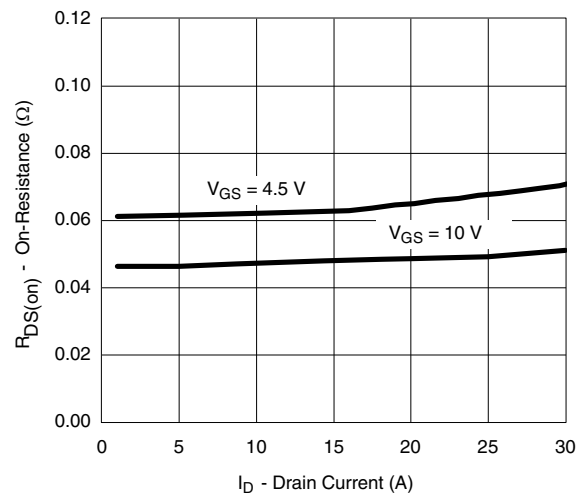
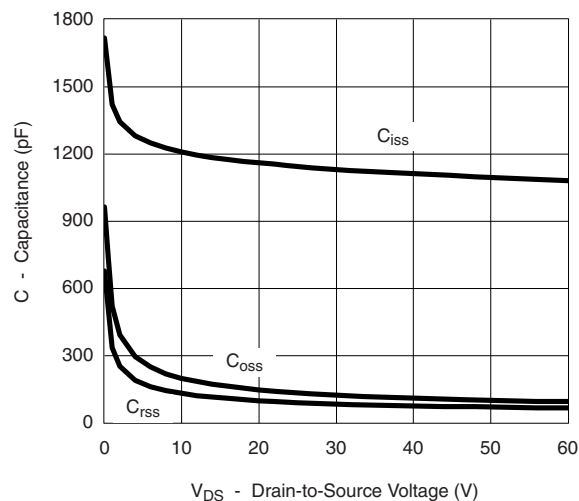
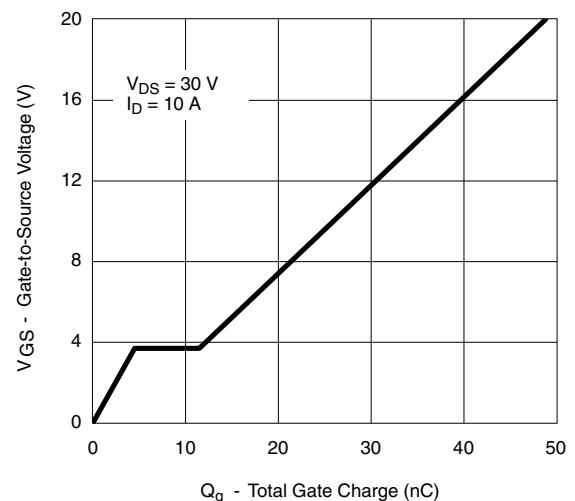
- Duty cycle ≤ 1 %.
- When mounted on 1" square PCB (FR-4 material).
- See SOA curve for voltage derating.
- Based up on $T_C = 25$ °C.

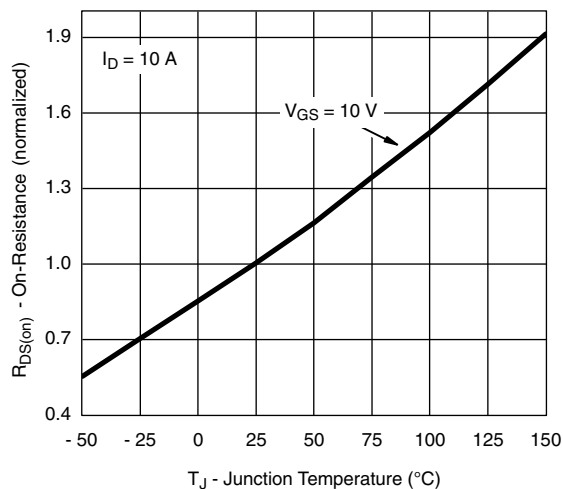
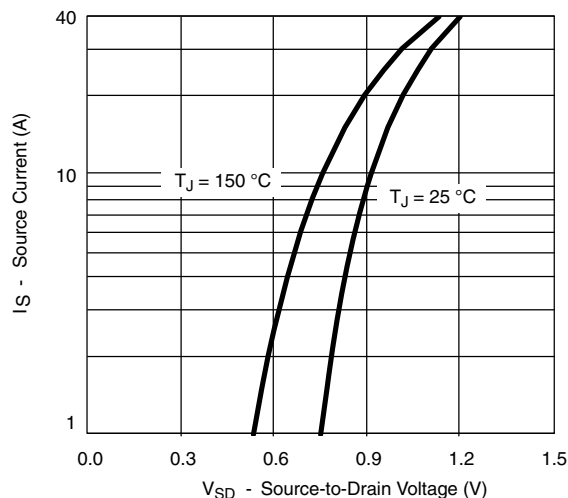
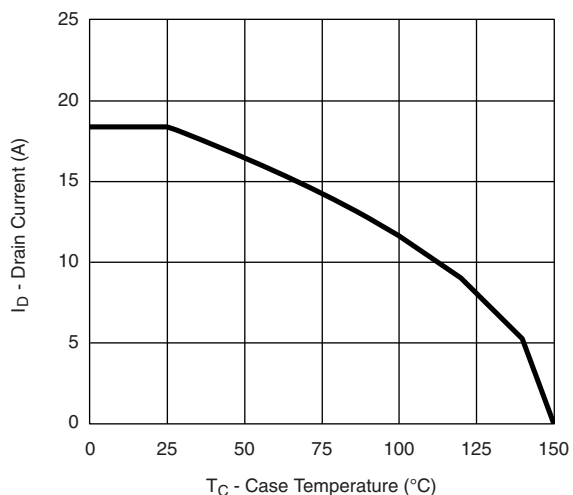
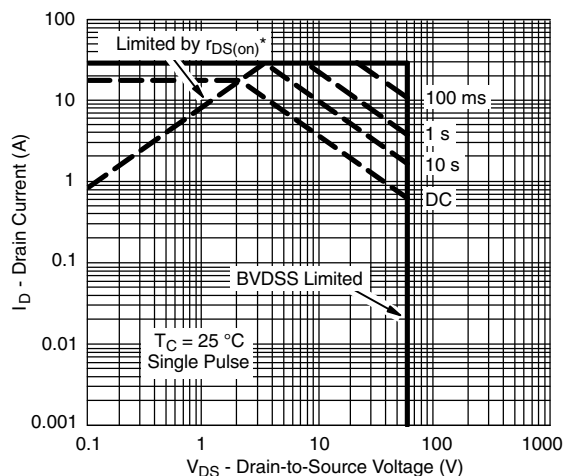
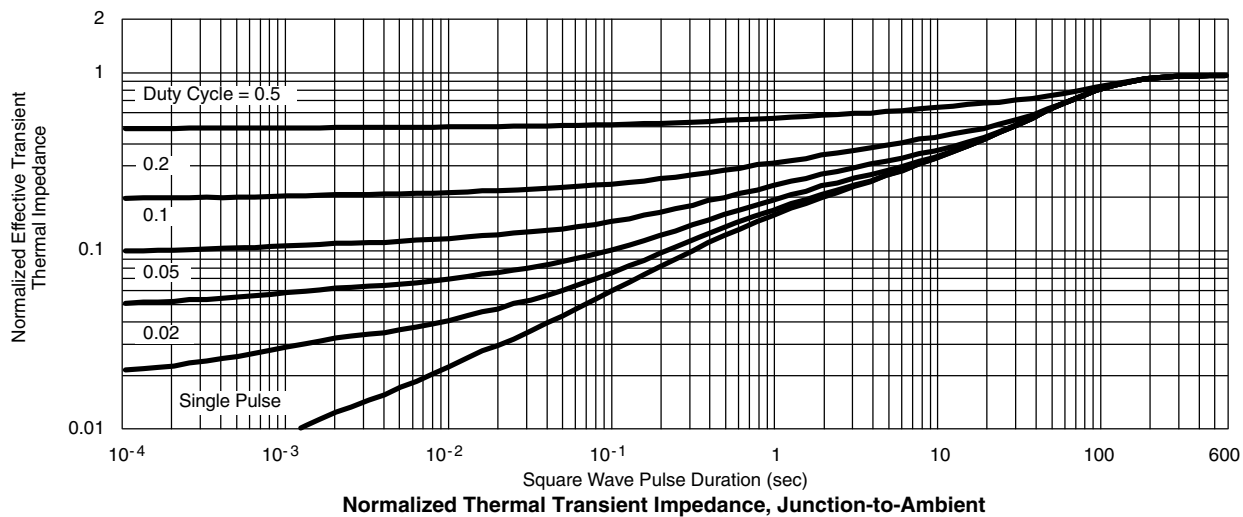
SPECIFICATIONS (T _J = 25 °C, unless otherwise note)						
Parameter	Symbol	Test Conditions	Min .	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = - 250 μA	- 60			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 3	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 60 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 48 V, V _{GS} = 0 V, T _J = 125 °C			- 50	
		V _{DS} = - 48 V, V _{GS} = 0 V, T _J = 150 °C			- 125	
On-State Drain Current ^a	I _{D(on)}	V _{DS} = - 5 V, V _{GS} = - 10 V	- 20			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 10 A		0.120		Ω
		V _{GS} = - 10 V, I _D = - 10 A, T _J = 125 °C		0.180		
		V _{GS} = - 10 V, I _D = - 10 A, T _J = 150 °C		0.204		
		V _{GS} = - 4.5 V, I _D = - 5 A		0.140		
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 10 A		22		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 25 V, f = 1 MHz		1000		pF
Output Capacitance	C _{oss}			130		
Reverse Transfer Capacitance	C _{rss}			90		
Total Gate Charge ^c	Q _g	V _{DS} = - 30 V, V _{GS} = - 10 V, I _D = - 10 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 MHz		7		Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 30 V, R _L = 3 Ω I _D ≅ - 19 A, V _{GEN} = - 10 V, R _g = 2.5 Ω		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 °C) ^b						
Continuous Current	I _S				- 5	A
Pulsed Current	I _{SM}				- 15	
Forward Voltage ^a	V _{SD}	I _F = - 19 A, V _{GS} = 0 V		- 1	- 1.5	V
Reverse Recovery Time	t _{rr}	I _F = - 19 A, di/dt = 100 A/μs		41	61	ns

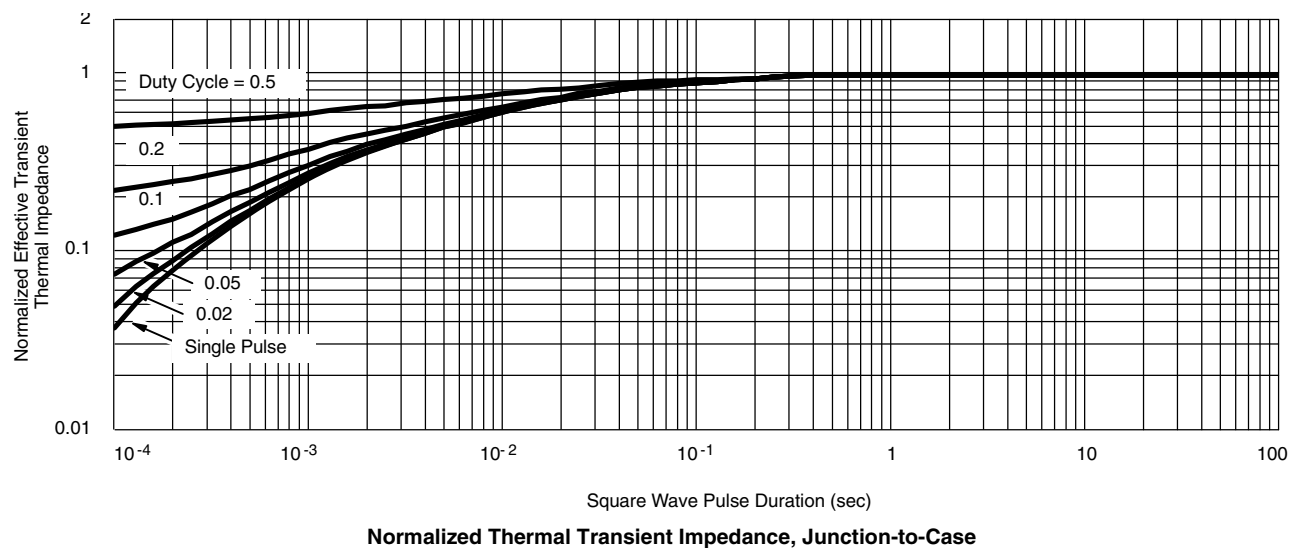
Notes:

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

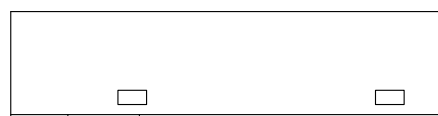
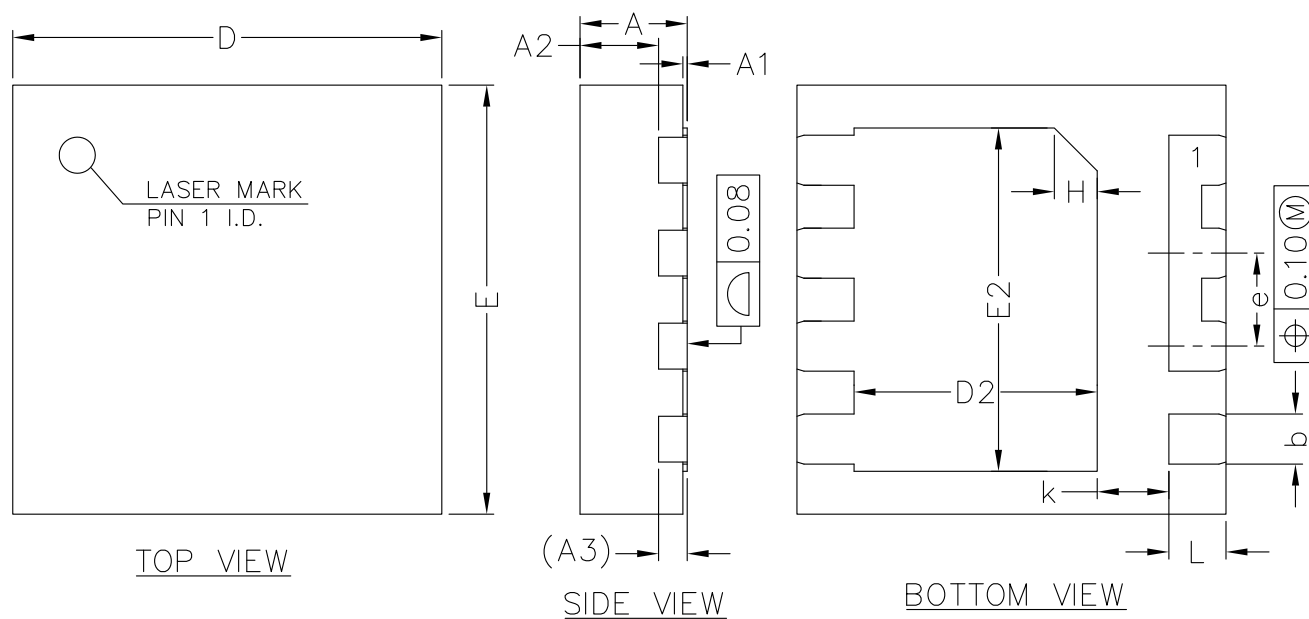
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

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**

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


THERMAL RATINGS

DFN3x3



SIDE VIEW

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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