AUIRFB8409-VB Datasheet

N-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY	
V_{DS} (V)	40
$R_{DS(on)}$ (Ω) at V_{GS} = 10 V	0.00084
I_D (A)	409
Configuration	Single
Qg (nC)	250

FEATURES

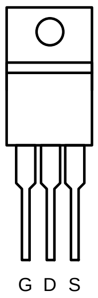
- TrenchFET® Power MOSFET
- 100 % R_g and UIS Tested

APPLICATIONS

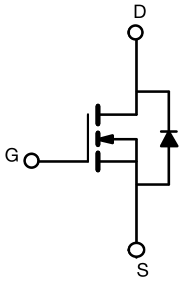
- Synchronous Rectification
- Power Supplies

RoHS
COMPLIANT
HALOGEN
FREE

TO-220AB



Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
PARAMETER		**SYMBOL**	**LIMIT**	**UNIT**
Drain-source voltage		V_{DS}	40	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current [a]	T_C = 25 °C	I_D	409	A
	T_C = 125 °C		320	
Continuous source current (diode conduction) [a]		I_S	409	
Pulsed drain current [b]		I_{DM}	600	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	100	
Single pulse avalanche energy		E_{AS}	500	mJ
Maximum power dissipation [b]	T_C = 25 °C	P_D	375	W
	T_C = 125 °C		125	
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 [c]	R_{thJA}	40	°C/W
Junction-to-case (drain)		R_{thJC}	0.4	

Notes

a. Based on T = 25 °C.

b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %

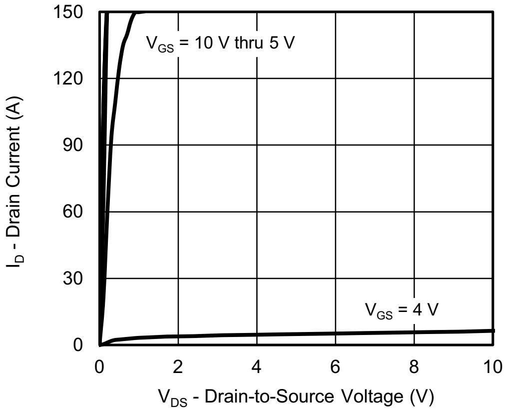
c. When mounted on 1" square PCB (FR4 material)

SPECIFICATIONS (T_C = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-source breakdown voltage	V_{DS}	V_{GS} = 0 V, I_D = 250 μA		40	-	-	V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA		2.5	3.0	3.5	
Gate-source leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I_{DSS}	V_{GS} = 0 V	V_{DS} = 40 V	-	-	1	μA
		V_{GS} = 0 V	V_{DS} = 40 V, T_J = 125 °C	-	-	50	
		V_{GS} = 0 V	V_{DS} = 40 V, T_J = 175 °C	-	-	300	μA
On-state drain current [a]	$I_{D(on)}$	V_{GS} = 10 V	V_{DS} ≥ 5 V	100	-	-	A
Drain-source on-state resistance [a]	$R_{DS(on)}$	V_{GS} = 10 V	I_D = 35 A	-	0.00084	-	Ω
		V_{GS} = 10 V	I_D = 35 A, T_J = 125 °C	-	0.00140	-	
		V_{GS} = 10 V	I_D = 35 A, T_J = 175 °C	-	0.00164	-	
Forward transconductance [b]	g_{fs}	V_{DS} = 15 V, I_D = 30 A		-	196	-	S
Dynamic [b]							
Input capacitance	C_{iss}	V_{GS} = 0 V	V_{DS} = 25 V, f = 1 MHz	-	11 938	15 525	pF
Output capacitance	C_{oss}			-	11 163	14 520	
Reverse transfer capacitance	C_{rss}			-	282	370	
Total gate charge [c]	Q_g	V_{GS} = 10 V	V_{DS} = 20 V, I_D = 100 A	-	158	250	nC
Gate-source charge [c]	Q_{gs}			-	44	-	
Gate-drain charge [c]	Q_{gd}			-	22	-	
Gate resistance	R_g	f = 1 MHz		2.70	5.44	8.20	Ω
Turn-on delay time [c]	$t_{d(on)}$	V_{DD} = 20 V, R_L = 0.2 Ω I_D ≅ 100 A, V_{GEN} = 10 V, R_g = 1 Ω		-	16	25	ns
Rise time [c]	t_r			-	10	17	
Turn-off delay time [c]	$t_{d(off)}$			-	103	160	
Fall time [c]	t_f			-	61	95	
Source-Drain Diode Ratings and Characteristics [b]							
Pulsed current [a]	I_{SM}			-	-	260	A
Forward voltage	V_{SD}	I_F = 60 A, V_{GS} = 0 V		-	0.81	1.5	V
Body diode reverse recovery time	t_{rr}	I_F = 30 A, di/dt = 100 A/μs		-	165	350	ns
Body diode reverse recovery charge	Q_{rr}			-	530	1100	nC
Reverse recovery fall time	t_a			-	66	-	ns
Reverse recovery rise time	t_b			-	99	-	
Body diode peak reverse recovery current	$I_{RM(REC)}$			-	-6.2	-	A

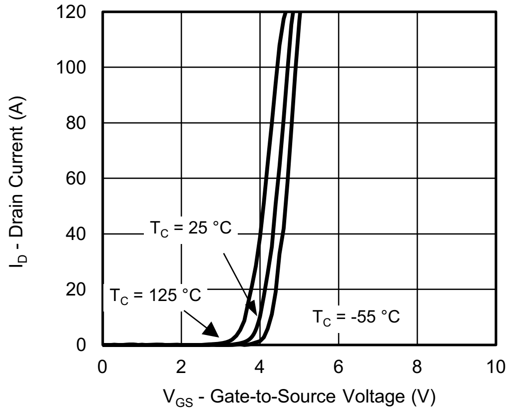
Notes

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

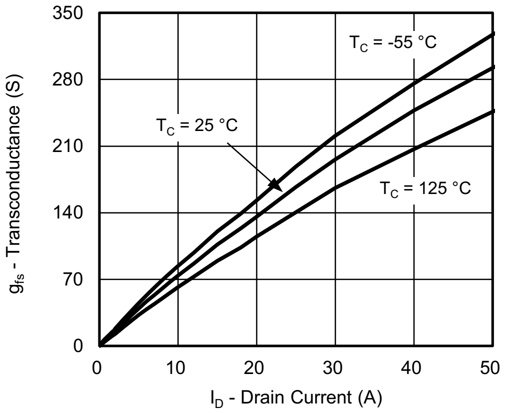
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



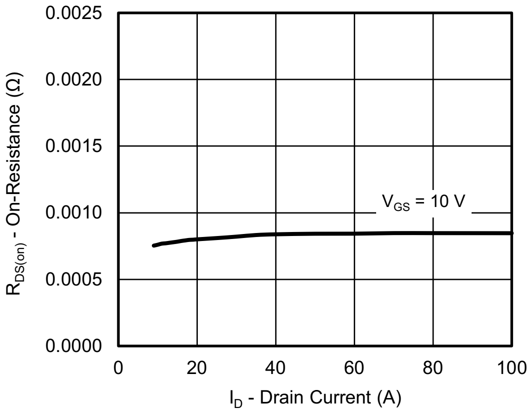
Output Characteristics



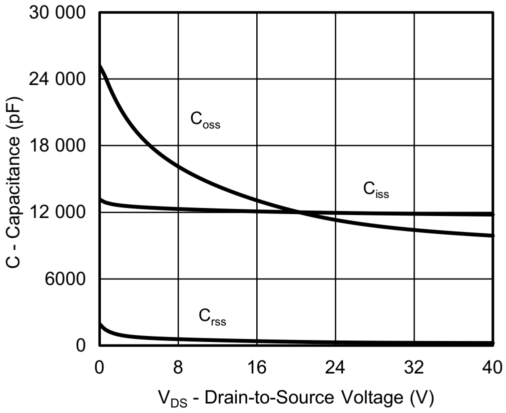
Transfer Characteristics



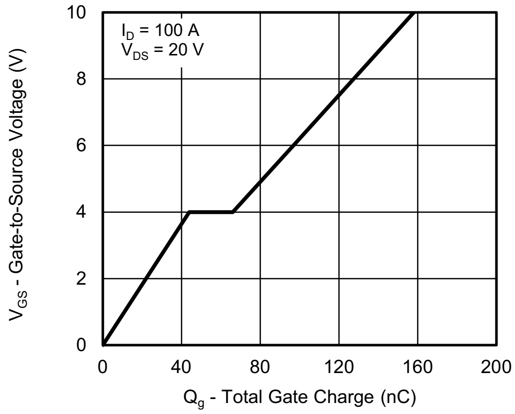
Transconductance



On-Resistance vs. Drain Current

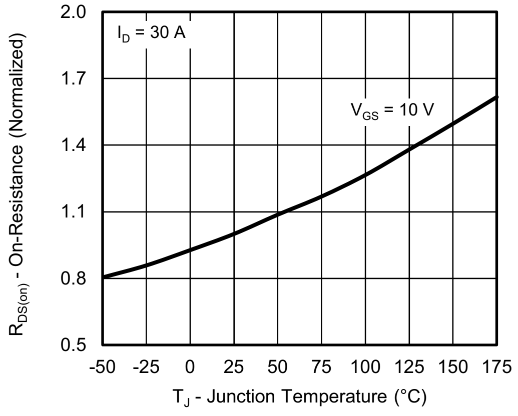


Capacitance

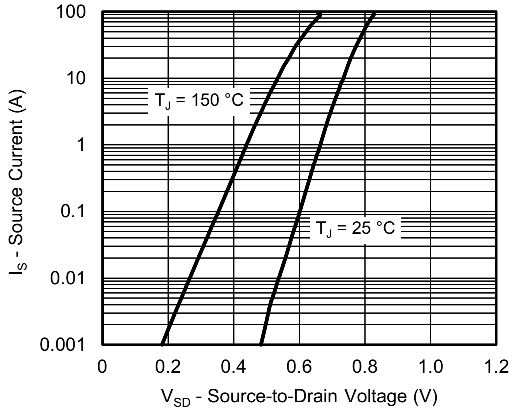


Gate Charge

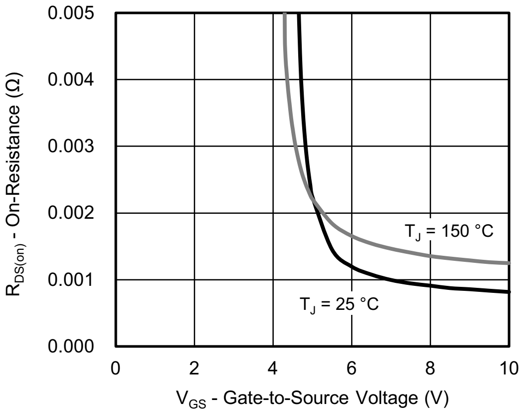
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



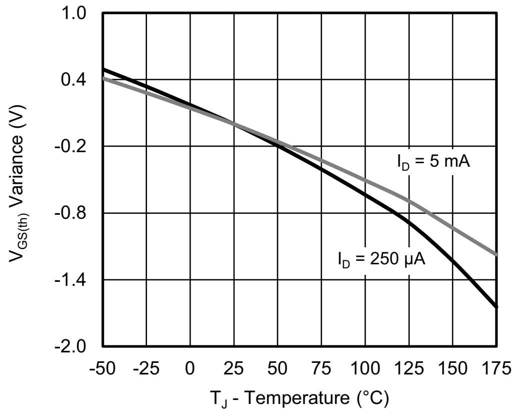
On-Resistance vs. Junction Temperature



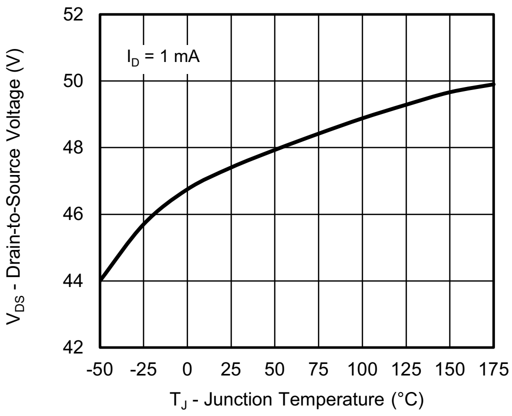
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

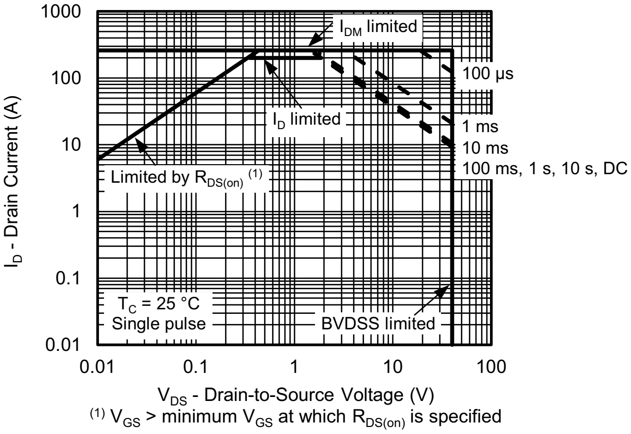


Threshold Voltage

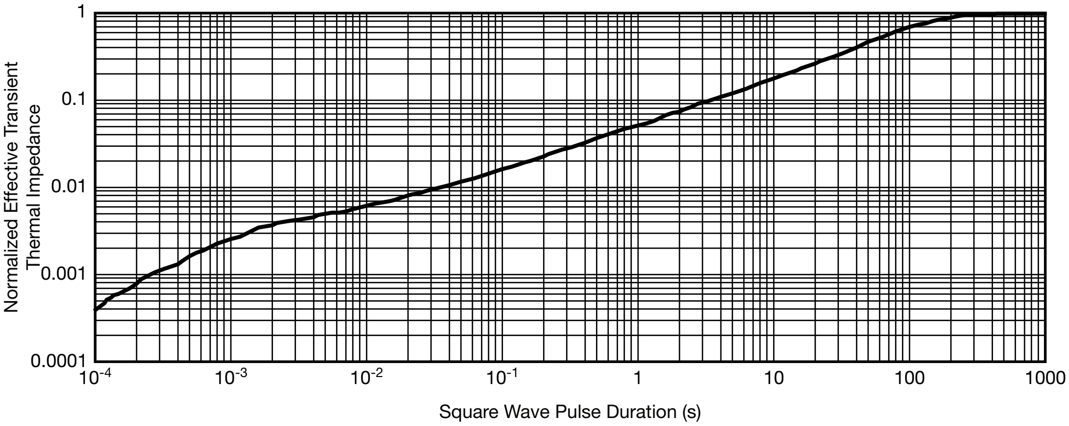


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)

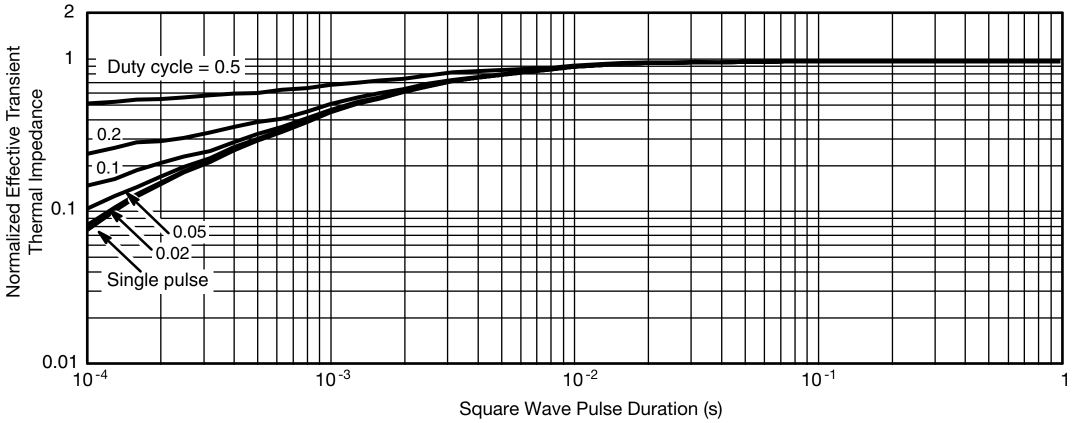


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient

THERMAL RATINGS (T_A = 25 °C, unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

Note

- The characteristics shown in the two graphs
  - Normalized Transient Thermal Impedance Junction-to-Ambient (25 °C)
  - Normalized Transient Thermal Impedance Junction-to-Case (25 °C)

  are given for general guidelines only to enable the user to get a “ball park” indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

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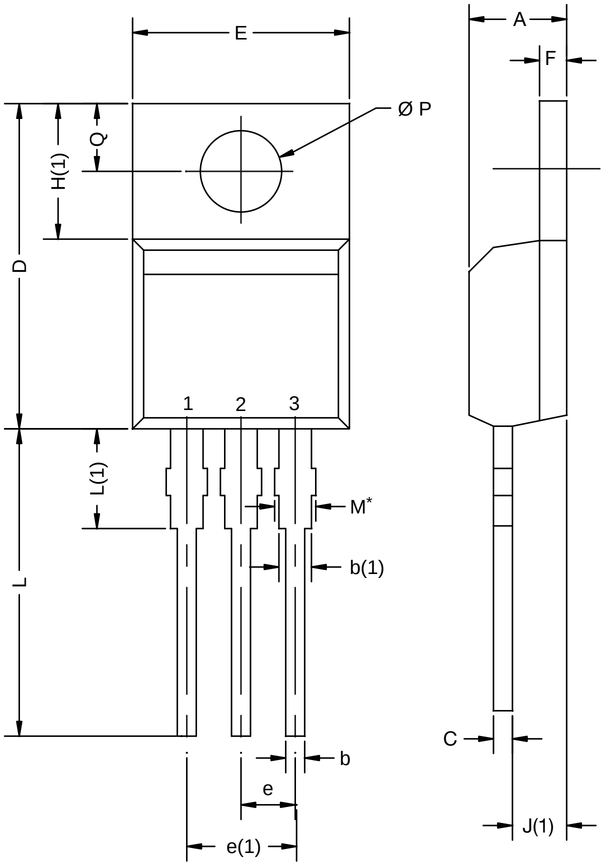

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	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
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118
ECN: X12-0208-Rev. N, 08-Oct-12 DWG: 5471				

Notes

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

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