

FDG6317NZ

MOSFET – Dual, N-Channel, POWERTRENCH®

20 V, 2.1 A, 550 mΩ

General Description

This dual N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized use in small switching regulators, providing an extremely low $R_{DS(ON)}$ and gate charge (QG) in a small package.

Features

- 0.7 A, 20 V
 - ♦ $R_{DS(ON)} = 400\text{ m}\Omega$ @ $V_{GS} = 4.5\text{ V}$
 - ♦ $R_{DS(ON)} = 550\text{ m}\Omega$ @ $V_{GS} = 2.5\text{ V}$
- Gate-Source Zener for ESD ruggedness
- Low Gate Charge
- High Performance Trench Technology for Extremely Low $R_{DS(ON)}$
- Compact Industry Standard SC70-6 Surface Mount Package
- These Devices are Pb-Free and are RoHS Compliant

Applications

- DC/DC Converter
- Power Management
- Load Switch

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	20	V
V_{GSS}	Gate-Source Voltage	± 12	V
I_D	Drain Current: Continuous (Note1) Pulsed	0.7 2.1	A
P_D	Power Dissipation for Single Operation	0.3	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to $+150$	$^\circ\text{C}$

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	FDG6317NZ	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, (Note 1)	415	$^\circ\text{C/W}$

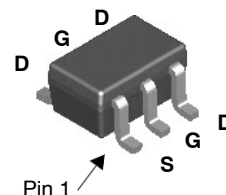
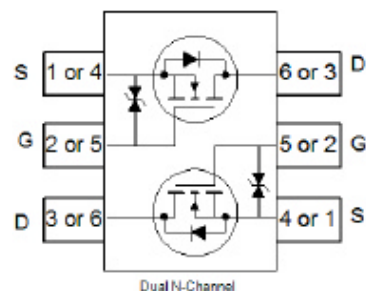
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA} = 415^\circ\text{C/W}$ when mounted on a minimum pad.



ON Semiconductor®

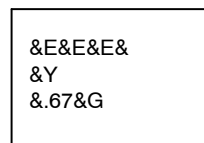
www.onsemi.com

V_{DSS}	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
20 V	550 mΩ	2.1 A



SC70-6
CASE 419B

MARKING DIAGRAM



&Y = Data Code
&.67&G = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

FDG6317NZ

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Reel Size	Tape Width	Quantity
.67	FDG6317NZ	7"	8 mm	3000 units

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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OFF CHARACTERISTICS

BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	20	–	–	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C	–	13	–	mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16\text{ V}, V_{GS} = 0\text{ V}$	–	–	1	μA
I_{GSS}	Gate–Body Leakage	$V_{GS} = \pm 12\text{ V}, V_{DS} = 0\text{ V}$	–	–	± 10	μA
I_{GSS}	Gate–Body Leakage	$V_{GS} = \pm 4.5\text{ V}, V_{DS} = 0\text{ V}$			± 1	μA

ON CHARACTERISTICS

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	0.6	1.2	1.5	V
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250\text{ }\mu\text{A}$, Referenced to 25°C	–	–2		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 4.5\text{ V}, I_D = 0.7\text{ A}$ $V_{GS} = 2.5\text{ V}, I_D = 0.6\text{ A}$ $V_{GS} = 4.5\text{ V}, I_D = 0.7\text{ A}, T_J = 125^\circ\text{C}$		300 450 390	400 550 560	m Ω
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 0\text{ V}$	1			A
g_{FS}	Forward Transconductance	$V_{DS} = 20\text{ V}, I_D = 5\text{ A}$	–	1.8	–	S

DYNAMIC CHARACTERISTICS

C_{iss}	Input Capacitance	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}$	–	66.5	–	pF
C_{oss}	Output Capacitance		–	19	–	pF
$C_{rss(eff.)}$	Reverse Transfer Capacitance		–	10	–	pF
R_G	Gate Resistance	$V_{GS} = 15\text{ mV}, f = 1.0\text{ MHz}$	–	5.8	–	Ω

SWITCHING CHARACTERISTICS

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 10\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 4.5\text{ V}, R_{GEN} = 6\text{ }\Omega$	–	5.5	11	ns
t_r	Turn-On Rise Time		–	7	15	ns
$t_{d(off)}$	Turn-Off Delay Time		–	7.5	15	ns
t_f	Turn-Off Fall Time		–	2.5	5	ns
Q_g	Total Gate Charge	$V_{DS} = 10\text{ V}, I_D = 0.7\text{ A},$ $V_{GS} = 4.5\text{ V},$		0.76	1.1	nC
Q_{gs}	Gate–Source Charge			0.18		nC
Q_{gd}	Gate–Drain Charge			0.20		nC

DRAIN–SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

I_S	Maximum Continuous Source to Drain Diode Forward Current		–	–	0.25	A
V_{SD}	Source to Drain Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 0.25\text{ A}$ (Note 2)	–	0.8	1.2	V
t_{rr}	Diode Reverse Recovery Time	$I_F = 0.7\text{ A}, dI_F/dt = 100\text{ A}/\mu\text{s}$	–	8.3	–	nS
Q_{rr}	Diode Reverse Recovery Charge		–	1.2	–	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2.0%

3. The diode connected between the gate and source serves only as protection against ESD. No gate overvoltage rating is implied.

TYPICAL PERFORMANCE CHARACTERISTICS

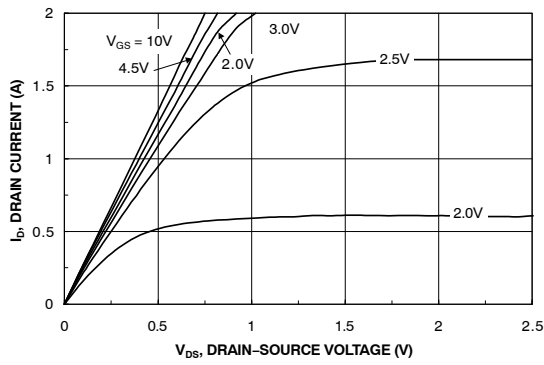


Figure 1. On-Region Characteristics

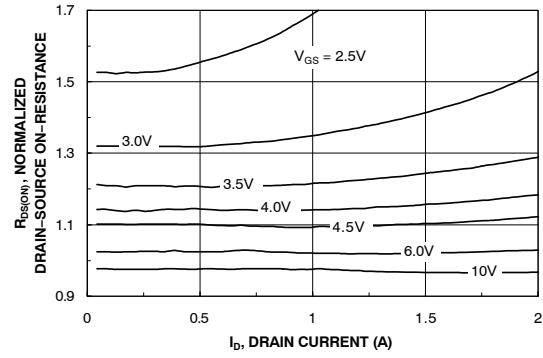


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage

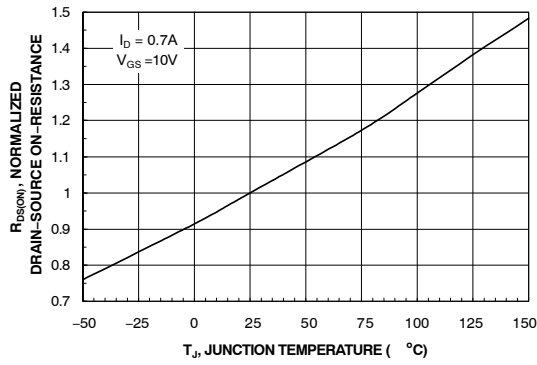


Figure 3. On-Resistance Variation with Temperature

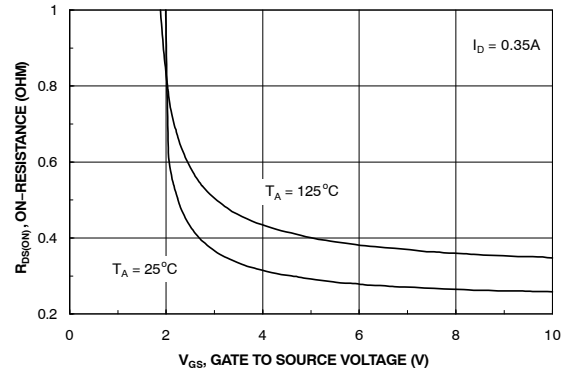


Figure 4. On-Resistance Variation with Gate-to-Source Voltage

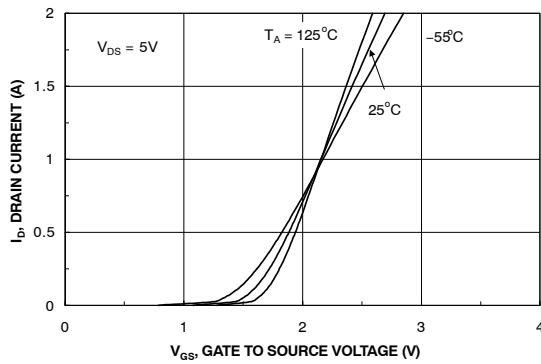


Figure 5. Transfer Characteristics

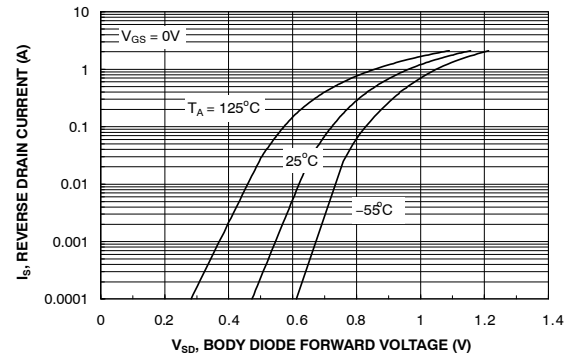


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature

TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

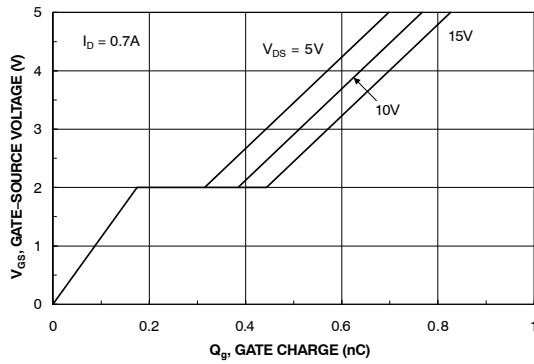


Figure 7. Gate Charge Characteristics

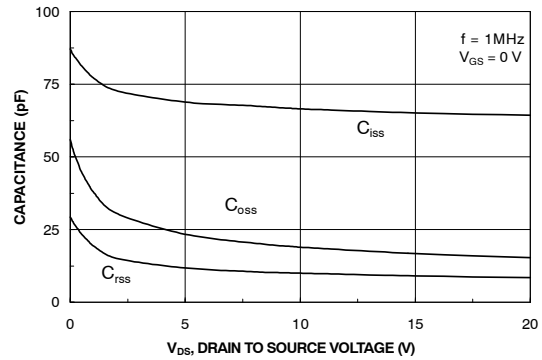


Figure 8. Capacitance Characteristics

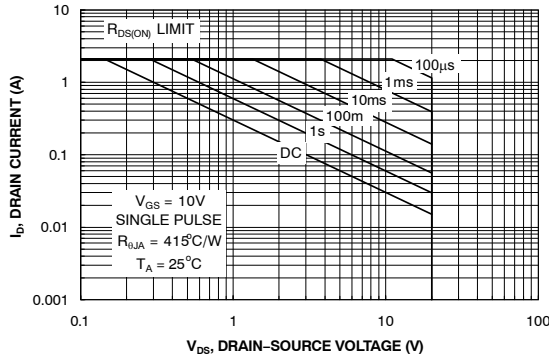


Figure 9. Maximum Safe Operating Area

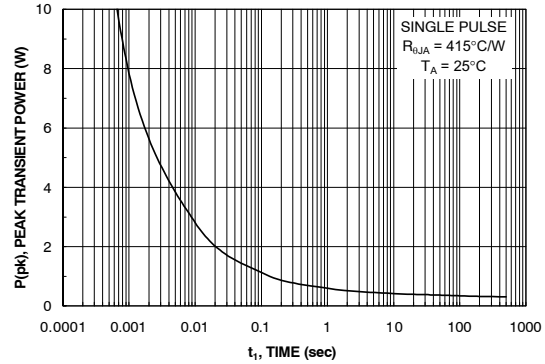


Figure 10. Single Pulse Maximum Power Dissipation

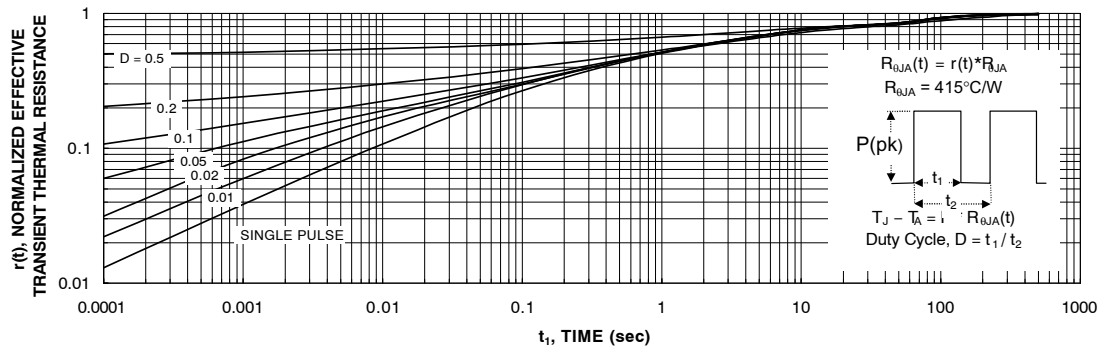


Figure 11. Transient Thermal Response Curve

ON



SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE Y

DATE 11 DEC 2012

STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13: PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 14: PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	STYLE 15: PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	STYLE 16: PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	STYLE 17: PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	STYLE 18: PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
STYLE 19: PIN 1. IOUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	STYLE 20: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	STYLE 21: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	STYLE 22: PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	STYLE 23: PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	STYLE 24: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 25: PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	STYLE 26: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 27: PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	STYLE 28: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	STYLE 29: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	STYLE 30: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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