Is Now Part of

ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

August 2016

FDC3612

100V N-Channel PowerTrench® MOSFET

General Description

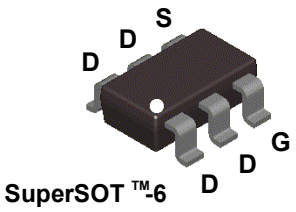
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

Applications

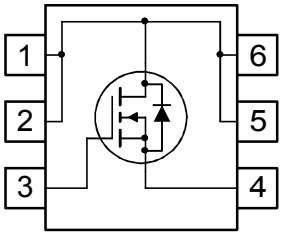
- DC/DC converter

Features

- 2.6 A, 100 V $R_{DS(ON)}$ = 125 mΩ @ V_{GS} = 10 V
  $R_{DS(ON)}$ = 135 mΩ @ V_{GS} = 6 V
- High performance trench technology for extremely low $R_{DS(ON)}$
- Low gate charge (14nC typ)
- High power and current handling capability
- Fast switching speed



SuperSOT ™-6



Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		100	V
V_{GSS}	Gate-Source Voltage		± 20	V
I_D	Drain Current – Continuous	(Note 1a)	2.6	A
	– Pulsed		20	
E_{AS}	Single Pulse Avalanche Energy	(Note 3)	37	mJ
P_D	Maximum Power Dissipation	(Note 1a)	1.6	W
		(Note 1b)	0.8	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		–55 to +150	°C

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	78	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	30	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
.362	FDC3612	7”	8mm	3000 units

Electrical Characteristics

T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Drain-Source Avalanche Ratings (Note 2)						
W_{DSS}	Drain-Source Avalanche Energy	Single Pulse, V_{DD} = 50 V, I_D=2.6 A			90	mJ
I_{AR}	Drain-Source Avalanche Current				2.6	A
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		99		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			10	μA
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –20 V, V_{DS} = 0 V			–100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2	2.3	4	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		– 6		mV/°C
$R_{DS(on)}$	Static Drain–Source On Resistance	V_{GS} = 10 V, I_D = 2.6 A V_{GS} = 6.0 V, I_D = 2.5 A V_{GS} = 10 V, I_D = 2.6 A;T_J = 125°C		86 91 157	125 135 240	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = 10 V, V_{DS} = 5 V	10			A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 2.6 A		10		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1.0 MHz		660		pF
C_{oss}	Output Capacitance			55		pF
C_{rss}	Reverse Transfer Capacitance			40		pF
R_g	Gate Resistance		0.1	1.4	3.0	Ω
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 50 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		6	11	ns
t_r	Turn–On Rise Time			3.5	7	ns
$t_{d(off)}$	Turn–Off Delay Time			23	37	ns
t_f	Turn–Off Fall Time			3.7	7.4	ns
Q_g	Total Gate Charge	V_{DS} = 50 V, I_D = 2.6 A, V_{GS} = 10 V		14	20	nC
Q_{gs}	Gate–Source Charge			2.3		nC
Q_{gd}	Gate–Drain Charge			3.6		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				1.3	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 1.3 A (Note 2)		0.76	1.2	V
t_{rr}	Diode Reverse Recovery Time	I_F = 2.6 A, d_{iF}/d_t = 100 A/μs (Note 2)		31		nS
Q_{rr}	Diode Reverse Recovery Charge			56		nC

Notes:

1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient 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 $R_{\theta CA}$ is determined by the user's board design.

a. 78°C/W when mounted on a 1in^2 pad of 2oz copper on FR-4 board.

b. 156°C/W when mounted on a minimum pad.

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

3. E_{AS} of 37 mJ is based on starting T_J = 25 °C; N-ch: L = 3 mH, I_{AS} = 5 A, V_{DD} = 100 V, V_{GS} = 10 V. 100% test at L = 0.3 mH, I_{AS} = 11 A.

Typical Characteristics

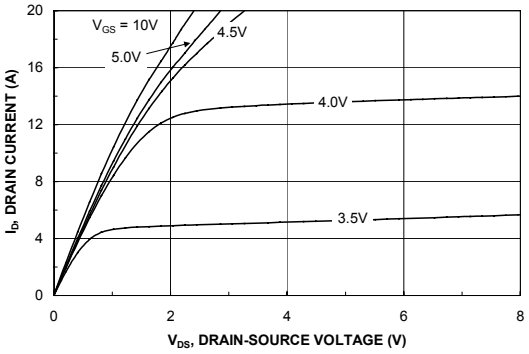


Figure 1. On-Region Characteristics.

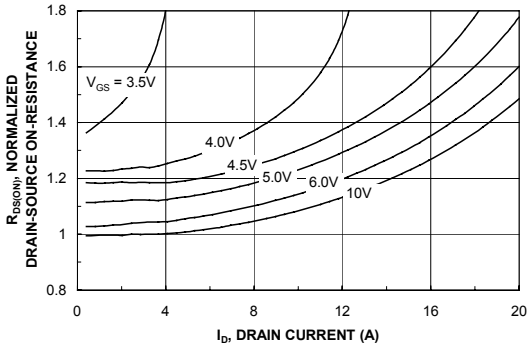


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

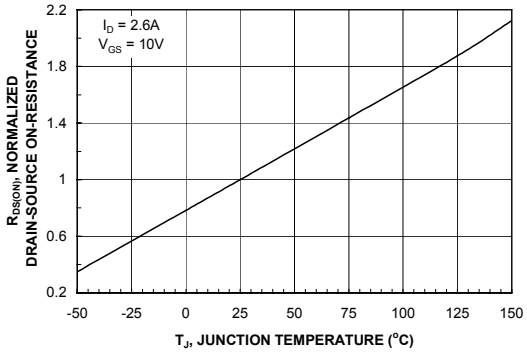


Figure 3. On-Resistance Variation with Temperature.

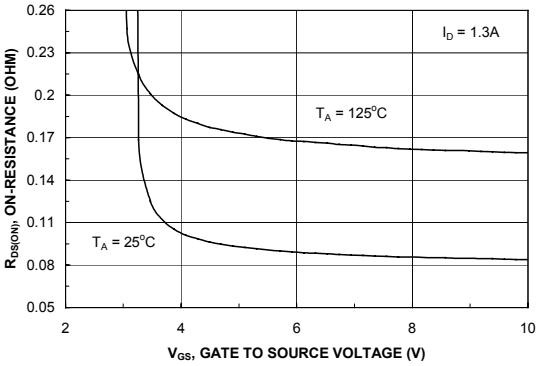


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

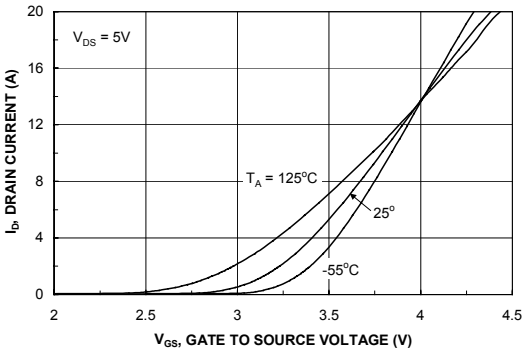


Figure 5. Transfer Characteristics.

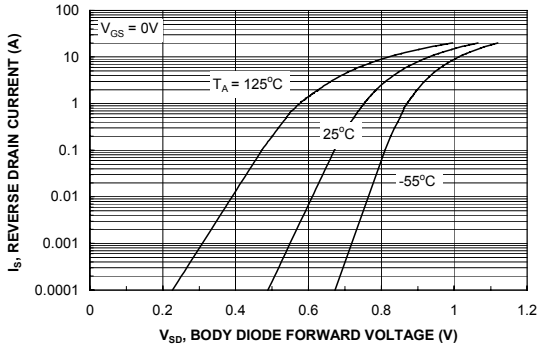


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

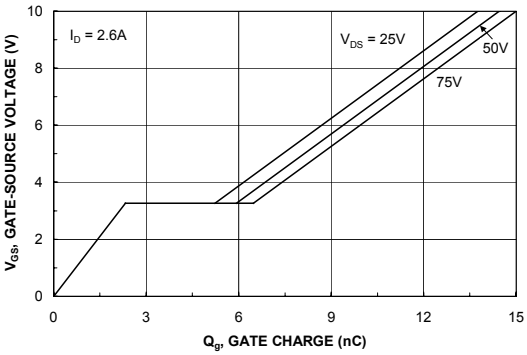


Figure 7. Gate Charge Characteristics.

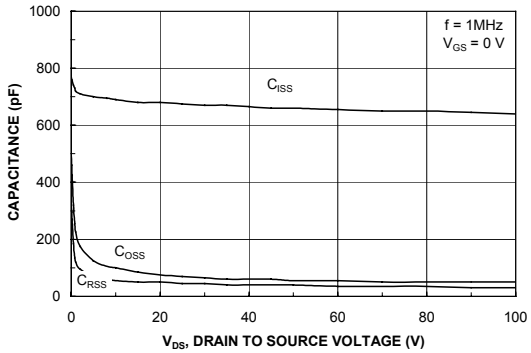


Figure 8. Capacitance Characteristics.

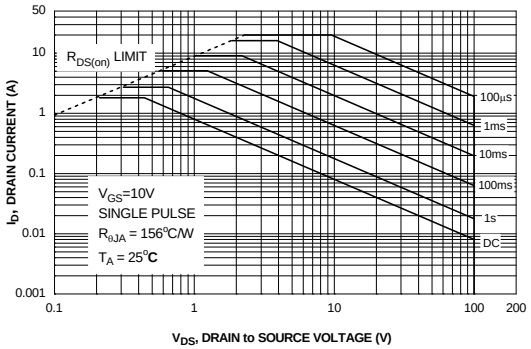


Figure 9. Maximum Safe Operating Area.

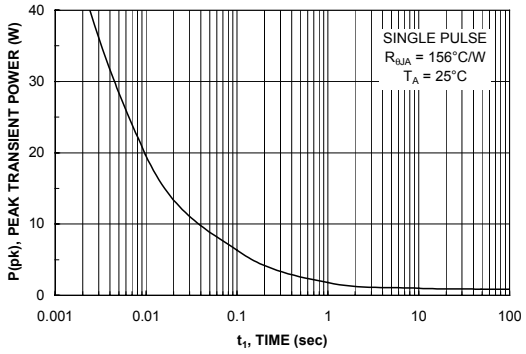


Figure 10. Single Pulse Maximum Power Dissipation.

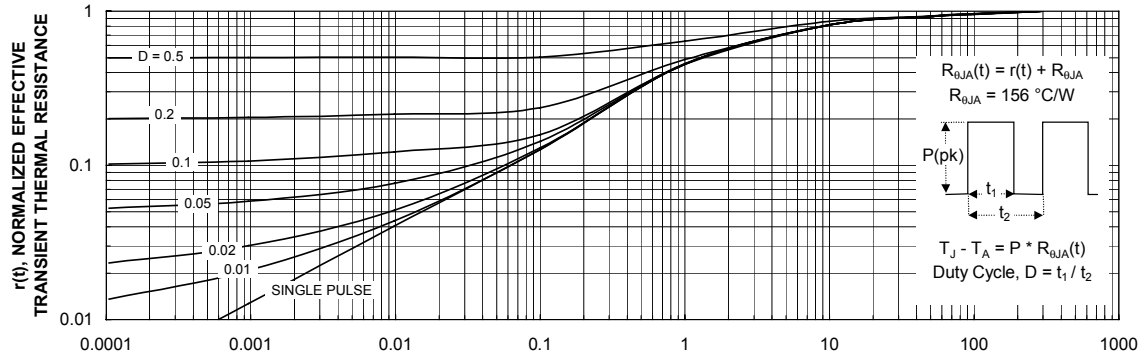
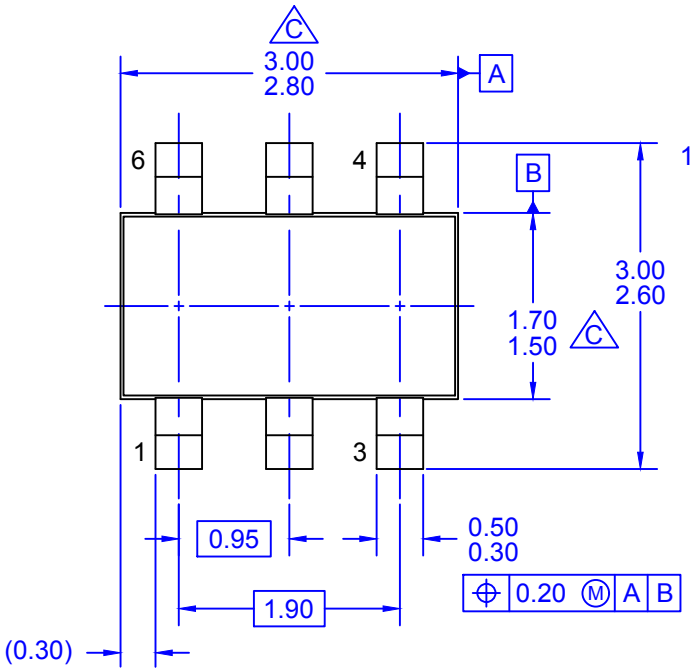
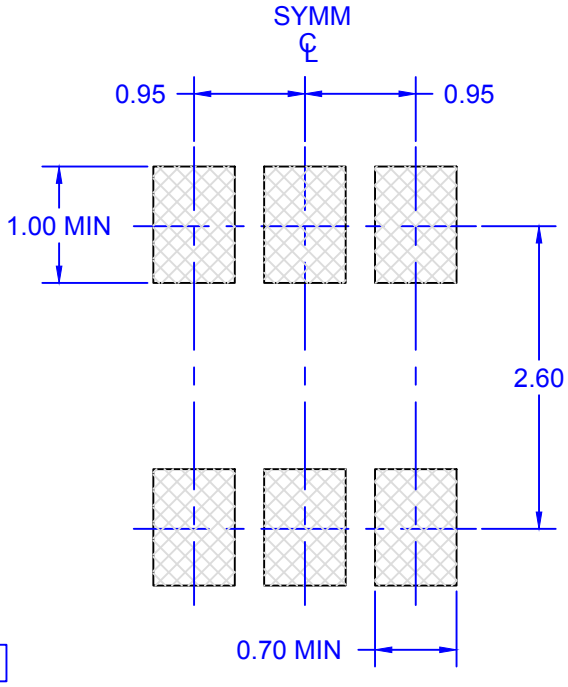


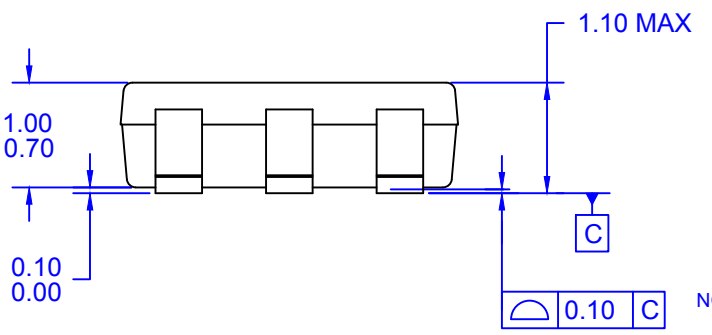
Figure 11. Transient Thermal Response Curve.

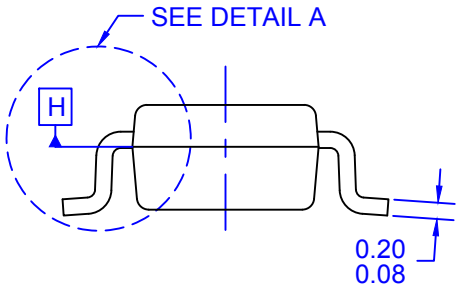
Thermal characterization performed using the conditions described in Note 1b. Transient thermal response will change depending on the circuit board design.

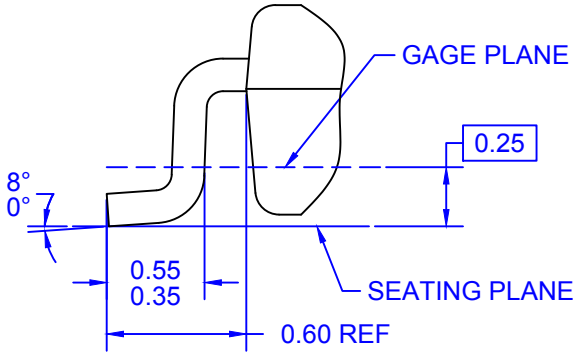




LAND PATTERN RECOMMENDATION







DETAIL A
SCALE: 50X

NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC MO-193. VAR. AA, ISSUE E.

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) PACKAGE LENGTH DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.25mm PER END. PACKAGE WIDTH DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25mm PER SIDE. PACKAGE LENGTH AND WIDTH DIMENSIONS ARE DETERMINED AT DATUM H.

D) DRAWING FILE NAME: MKT-MA06AREVF

ON Semiconductor

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5817−1050

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative