



FDN5630

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60V 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.

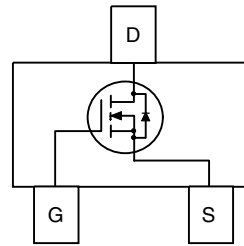
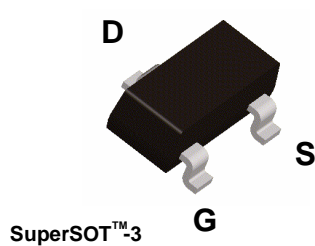
This MOSFET features very low $R_{DS(ON)}$ in a small SOT23 footprint. Fairchild's PowerTrench technology provides faster switching than other MOSFETs with comparable $R_{DS(ON)}$ specifications. The result is higher overall efficiency with less board space.

Features

- 1.7 A, 60 V. $R_{DS(ON)} = 0.100 \Omega @ V_{GS} = 10 \text{ V}$
 $R_{DS(ON)} = 0.120 \Omega @ V_{GS} = 6 \text{ V}$.
- Optimized for use in high frequency DC/DC converters.
- Low gate charge.
- Very fast switching.
- SuperSOT™ - 3 provides low $R_{DS(ON)}$ in SOT23 footprint.

Applications

- DC/DC converter
- Motor drives



Absolute Maximum Ratings $T_A = 25 \text{ C}$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain-Source Voltage	60	V
V_{GSS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous (Note 1a) - Pulsed	1.7	A
		10	
P_D	Power Dissipation for Single Operation (Note 1a) (Note 1b)	0.5	W
		0.46	
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$

Thermal Characteristics

$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (Note 1a)	250	$^{\circ}\text{C/W}$
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)	75	$^{\circ}\text{C/W}$

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape Width	Quantity
5630	FDN5630	7	8mm	3000 units

Electrical Characteristics $T_A = 25\text{ C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off Characteristics

BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		63		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 48\text{ V}, V_{GS} = 0\text{ V}$			1	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = 20\text{ V}, V_{DS} = 0\text{ V}$			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -20\text{ V}, V_{DS} = 0\text{ V}$			-100	nA

On Characteristics (Note 2)

$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1	2.4	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250\text{ }\mu\text{A}$, Referenced to 25°C		6.9		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10\text{ V}, I_D = 1.7\text{ A}$ $V_{GS} = 10\text{ V}, I_D = 1.7\text{ A}, T_J = 125^\circ\text{C}$ $V_{GS} = 6\text{ V}, I_D = 1.6\text{ A}$		0.073 0.127 0.083	0.100 0.180 0.120	Ω
$I_{D(on)}$	On-State Drain Current	$V_{GS} = 10\text{ V}, V_{DS} = 1.7\text{ V}$	5			A
g_{FS}	Forward Transconductance	$V_{DS} = 10\text{ V}, I_D = 1.7\text{ A}$		6		S

Dynamic Characteristics

C_{iss}	Input Capacitance	$V_{DS} = 15\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		400	560	pF
C_{oss}	Output Capacitance			65	95	pF
C_{riss}	Reverse Transfer Capacitance			27	40	pF

Switching Characteristics (Note 2)

$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 30\text{ V}, I_D = 1\text{ A},$ $V_{GS} = 10\text{ V}, R_{GEN} = 6\text{ }\Omega$		10	20	ns
t_r	Turn-On Rise Time			6	15	ns
$t_{d(off)}$	Turn-Off Delay Time			15	28	ns
t_f	Turn-Off Fall Time			5	15	ns
Q_g	Total Gate Charge	$V_{DS} = 20\text{ V}, I_D = 1.7\text{ A},$ $V_{GS} = 10\text{ V},$		7	10	nC
Q_{gs}	Gate-Source Charge			1.6		nC
Q_{gd}	Gate-Drain Charge			1.2		nC

Drain-Source Diode Characteristics and Maximum Ratings

I_S	Maximum Continuous Drain-Source Diode Forward Current			0.42		A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = 0.42\text{ A}$ (Note 2)		0.72	1.2	V

Notes:

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.



a) 250°C/W when mounted on a 0.02 in^2 Pad of 2 oz. Cu.



b) 270°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

2: Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2.0\%$

Typical Characteristics

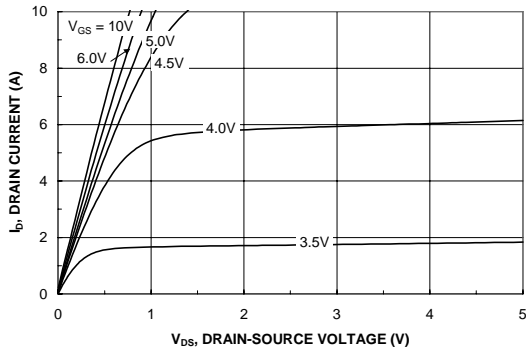


Figure 1. On-Region Characteristics.

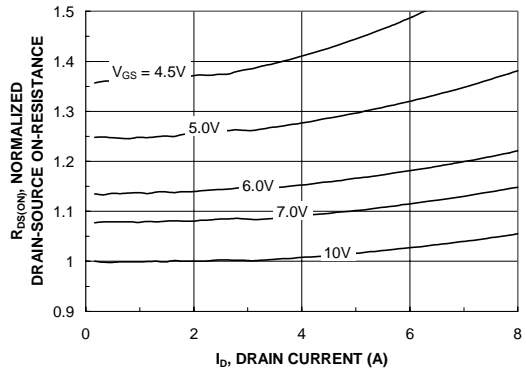


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

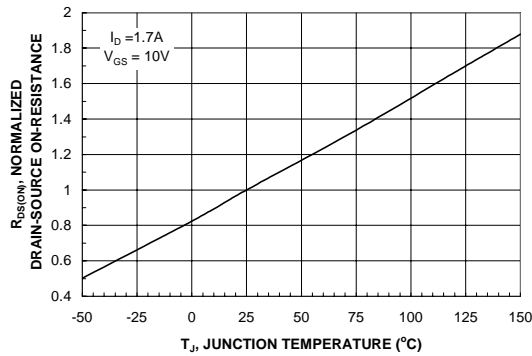


Figure 3. On-Resistance Variation with Temperature.

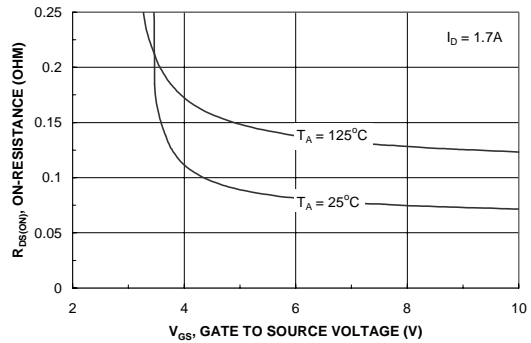


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

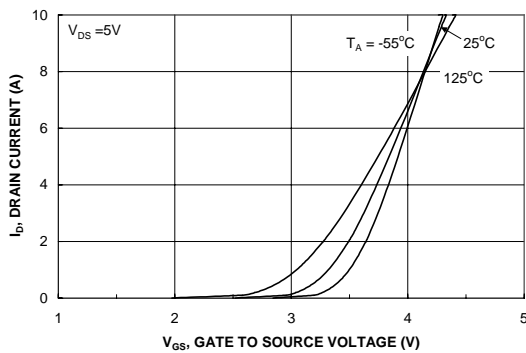


Figure 5. Transfer Characteristics.

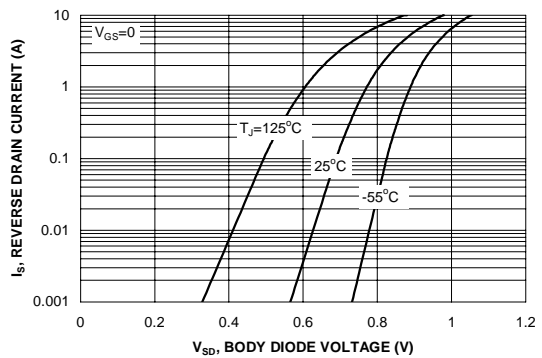
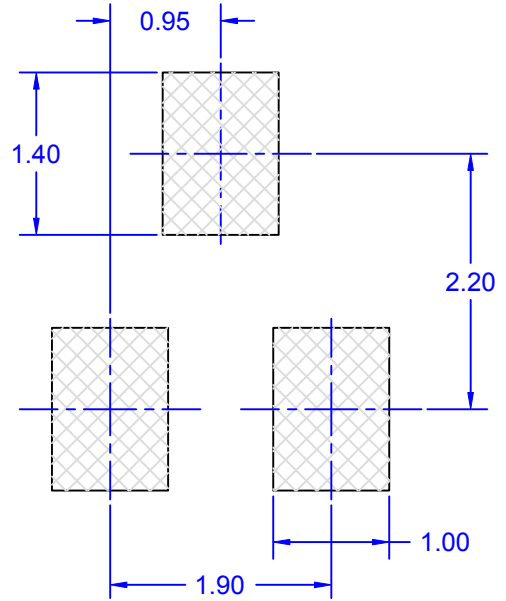
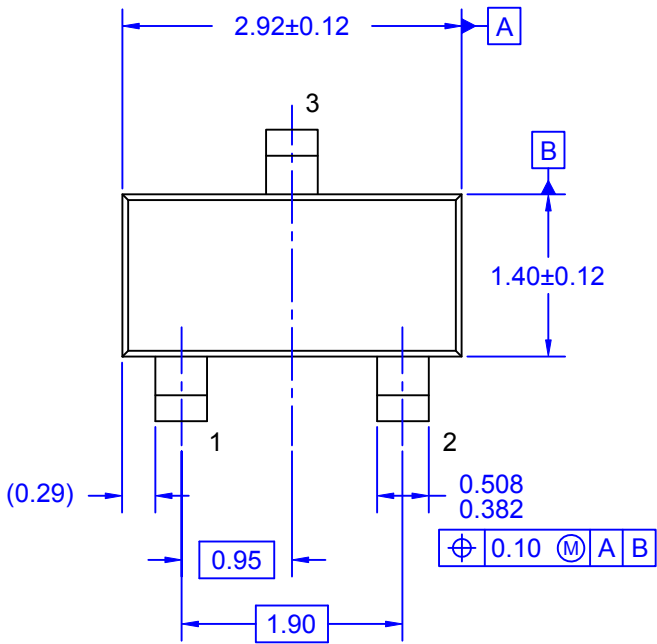
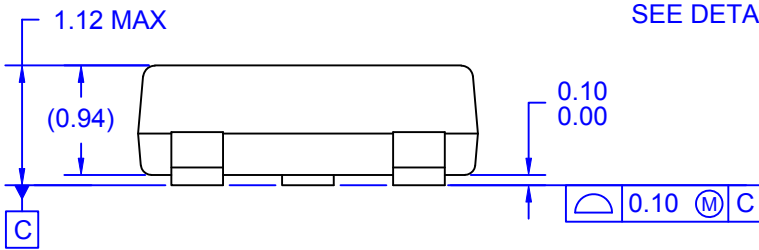


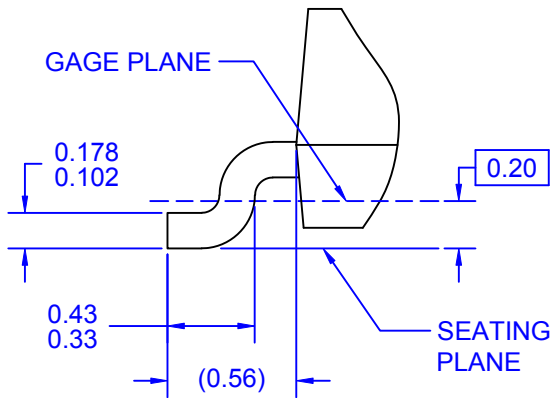
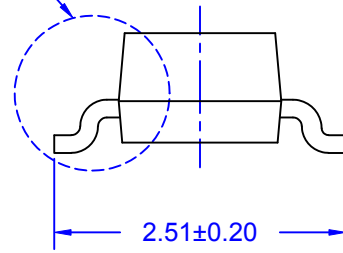
Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.



LAND PATTERN RECOMMENDATION



SEE DETAIL A



DETAIL A

SCALE: 50:1

NOTES: UNLESS OTHERWISE SPECIFIED

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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
- D) DIMENSIONING AND TOLERANCING PER ASME Y14.5M - 2009.
- E) DRAWING FILE NAME: MKT-MA03BREV3





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