FAIRCHILD

SEMICONDUCTOR®

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Si6426DQ

20V N-Channel PowerTrench® MOSFET

General Description

This N-Channel MOSFET is a rugged gate version of Fairchild Semiconductor's advanced PowerTrench process. It has been optimized for power management applications requiring a wide range of gate drive voltage ratings (2.5V to 8V).

Applications

- Battery protection
- DC/DC conversion
- Power management
- Load switch

Features

- 5.4 A, 20 V $R_{DS(ON)}$ = 35 mΩ @ V_{GS} = 4.5 V
  $R_{DS(ON)}$ = 40 mΩ @ V_{GS} = 2.5 V

- Extended V_{GSS} range (±8V) for battery applications

- High performance trench technology for extremely low $R_{DS(ON)}$

- Low profile TSSOP-8 package

TSSOP-8

Pin 1
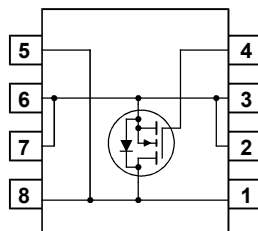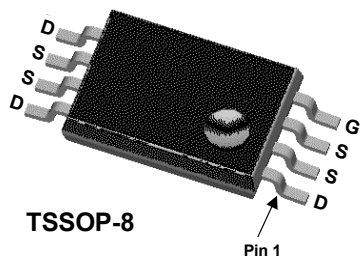
Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		± 8	V
I_D	Drain Current – Continuous	(Note 1)	5.4	A
	– Pulsed		30	
P_D	Power Dissipation	(Note 1a)	1.4	W
		(Note 1b)	1.1	
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)	87	°C/W
		(Note 1b)	114	

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
6426	Si6426DQ	13''	16mm	3000 units

Electrical Characteristics
$T_A = 25°C$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain–Source Breakdown Voltage	$V_{GS} = 0$ V, $\quad I_D = 250$ μA	20			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = 250$ μA, Referenced to 25°C		14		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 20$ V, $\quad V_{GS} = 0$ V			1	μA
		$V_{DS} = 20$ V, $V_{GS} = 0$ V, T_J=55°C			5	
I_{GSSF}	Gate–Body Leakage, Forward	$V_{GS} = 8$ V, $\quad V_{DS} = 0$ V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	$V_{GS} = –8$ V, $\quad V_{DS} = 0$ V			–100	nA
On Characteristics (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, $\quad I_D = 250$ μA	0.6	0.9	1.5	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = 250$ μA, Referenced to 25°C		–3		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = 4.5$ V, $\quad I_D = 5.4$ A $V_{GS} = 2.5$ V, $\quad I_D = 4.9$ A		23 33	35 40	mΩ
$I_{D(on)}$	On–State Drain Current	$V_{GS} = 4.5$ V, $\quad V_{DS} = 5$ V	20			A
		$V_{GS} = 2.5$ V, $\quad V_{DS} = 5$ V	8			
g_{FS}	Forward Transconductance	$V_{DS} = 10$ V, $\quad I_D = 5.4$ A		11		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = 10$ V, $\quad V_{GS} = 0$ V,		710		pF
C_{oss}	Output Capacitance	$f = 1.0$ MHz		173		pF
C_{rss}	Reverse Transfer Capacitance			84		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = 6$ V, $\quad I_D = 1$ A,		7	14	ns
t_r	Turn–On Rise Time	$V_{GS} = 4.5$ V, $\quad R_{GEN} = 6$ Ω		17	31	ns
$t_{d(off)}$	Turn–Off Delay Time			16	29	ns
t_f	Turn–Off Fall Time			3	6	ns
t_{rr}	Reverse Recovery Time	$V_{GS} = 0$ V, $\quad I_F = 1.5$ A, $dI_F/dt = 100$A/μs		14	100	ns
Q_g	Total Gate Charge	$V_{DS} = 6$ V, $\quad I_D = 5.4$ A,		7	10	nC
Q_{gs}	Gate–Source Charge	$V_{GS} = 4.5$ V		1.5		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				1.25	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0$ V, $\quad I_S = 1.25$ A (Note 2)		0.7	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 $R_{\theta CA}$ is determined by the user's board design.

a) 87°C/W when mounted on a 1in² pad of 2 oz copper.

b) 114°C/W when mounted on a minimum pad of 2 oz copper.

c) Scale 1 : 1 on letter size paper

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

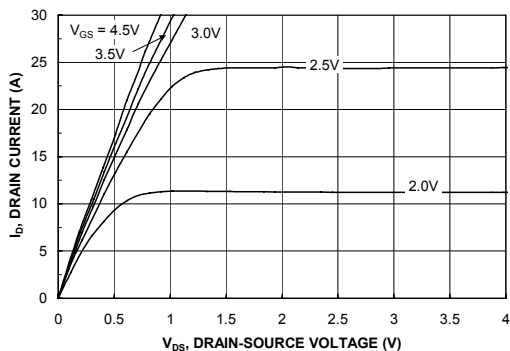## Typical Characteristics

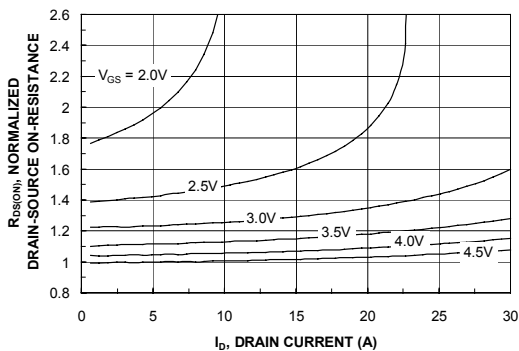**Figure 1. On-Region Characteristics.**

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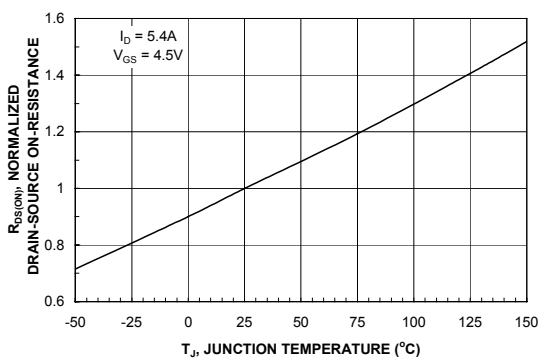

Figure 3. On-Resistance Variation with Temperature.
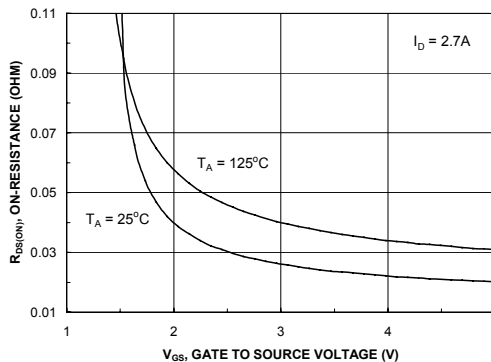

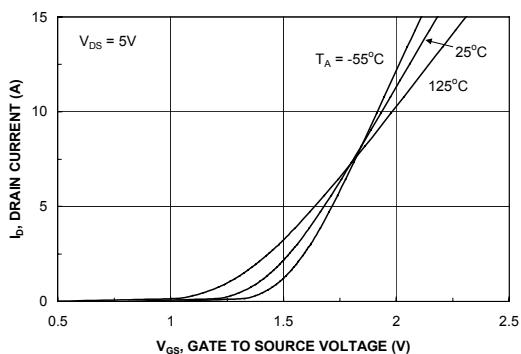**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**

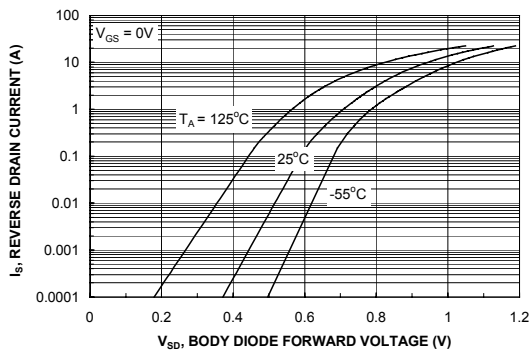**Figure 5. Transfer Characteristics.**

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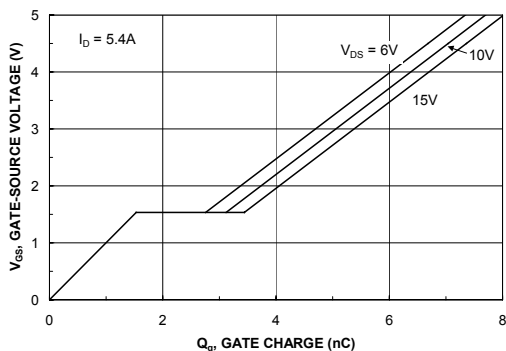
Typical Characteristics
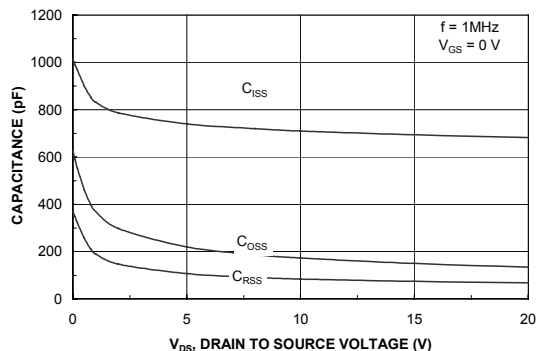

Figure 7. Gate Charge Characteristics.

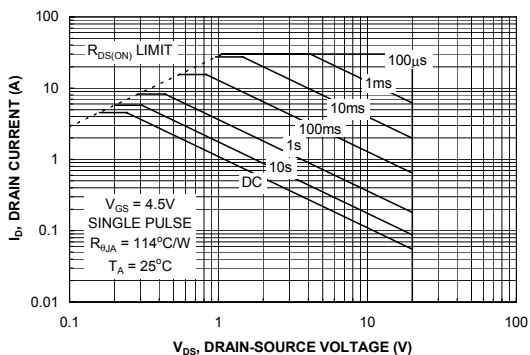Figure 8. Capacitance Characteristics.

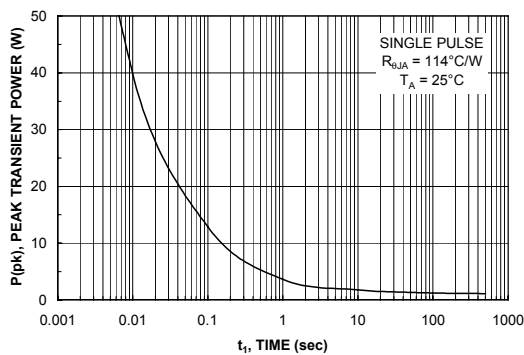

Figure 9. Maximum Safe Operating Area.

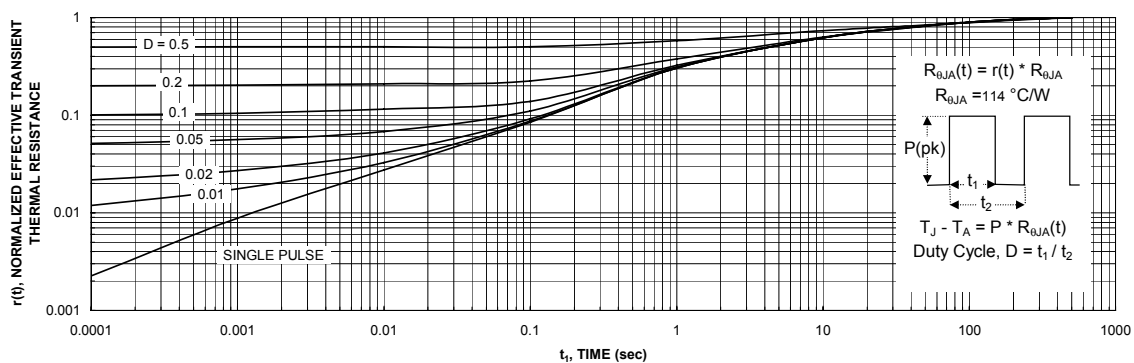Figure 10. Single Pulse Maximum
Power Dissipation.

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.**

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Product status/pricing/packaging

Product	Product status	Pricing*	Package type	Leads	Package marking	Packing method
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