Si9435DY

Yixin

P-Channel Logic Level PowerTrench® MOSFET

General Description

This P-Channel Logic Level MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance and yet maintain superior switching performance.

These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

Applications

- DC/DC converter
- Load switch
- Motor Drive

Features

- −5.3 A, −30 V. $R_{DS(ON)}$ = 50 mΩ @ V_{GS} = −10 V

  $R_{DS(ON)}$ = 80 mΩ @ V_{GS} = −4.5 V

- Low gate charge

- Fast switching speed

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

- High power and current handling capability

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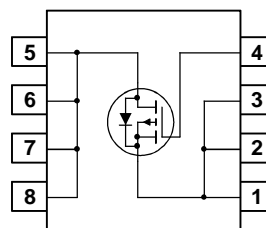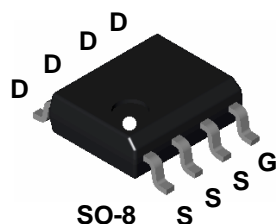
Absolute Maximum Ratings T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		−30	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Drain Current – Continuous	(Note 1a)	-5.3	A
	– Pulsed		-20	
P_D	Power Dissipation for Single Operation	(Note 1a)	2.5	W
		(Note 1b)	1.2	
		(Note 1c)	1.0	
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)	50	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	25	°C/W

Package Marking and Ordering Information

Device Marking	Device	Reel Size	Tape width	Quantity
9435	Si9435DY	13''	12mm	2500 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, $I_D = -250$ μA	–30			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	$I_D = -250$ μA, Referenced to 25°C		–22		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -24$ V, $V_{GS} = 0$ V			–1	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	–1	–1.7	–3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	$I_D = -250$ μA, Referenced to 25°C		4		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	$V_{GS} = -10$ V, $I_D = -5.3$ A		38	50	mΩ
		$V_{GS} = -10$ V, $I_D = -5.3$ A, $T_J = 125°C$		54	79	
		$V_{GS} = -4.5$ V, $I_D = -4.2$A,		55	80	
$I_{D(on)}$	On–State Drain Current	$V_{GS} = -10$ V, $V_{DS} = -5$ V	–20			A
g_{FS}	Forward Transconductance	$V_{DS} = -15$ V, $I_D = -5.3$ A		12		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -15$ V, $V_{GS} = 0$ V,		690		pF
C_{oss}	Output Capacitance	f = 1.0 MHz		306		pF
C_{rss}	Reverse Transfer Capacitance			77		pF
Switching Characteristics (Note 2)						
$t_{d(on)}$	Turn–On Delay Time	$V_{DD} = -15$ V, $I_D = -1$ A,		7	14	ns
t_r	Turn–On Rise Time	$V_{GS} = -10$ V, $R_{GEN} = 6$ Ω		10	18	ns
$t_{d(off)}$	Turn–Off Delay Time			19	34	ns
t_f	Turn–Off Fall Time			11	20	ns
Q_g	Total Gate Charge	$V_{DS} = -15$ V, $I_D = -5.3$ A,		14	23	nC
Q_{gs}	Gate–Source Charge	$V_{GS} = -10$ V		2.4		nC
Q_{gd}	Gate–Drain Charge			4.8		nC
Drain–Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain–Source Diode Forward Current				–5.3	A
V_{SD}	Drain–Source Diode Forward Voltage	$V_{GS} = 0$ V, $I_S = -5.3$ A (Note 2)		–0.86	–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.
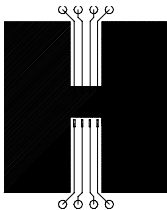
a) 50°C/W when mounted on a 1in^2 pad of 2 oz copper
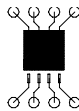
b) 105°C/W when mounted on a .04 in^2 pad of 2 oz copper
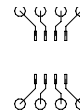
c) 125°C/W when mounted on a minimum pad.

Scale 1 : 1 on letter size paper

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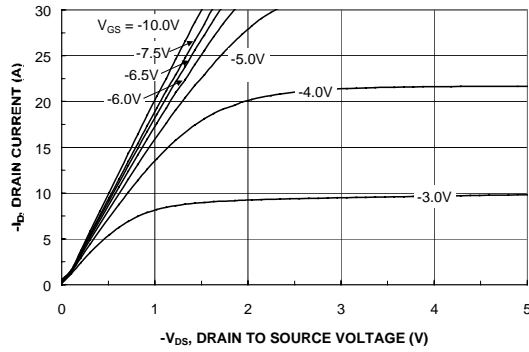
Typical Characteristics

Figure 1. On-Region Characteristics.
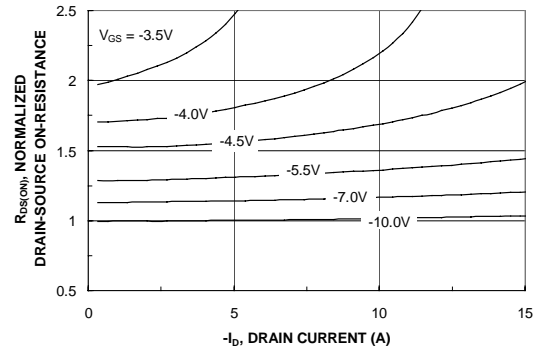

Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.
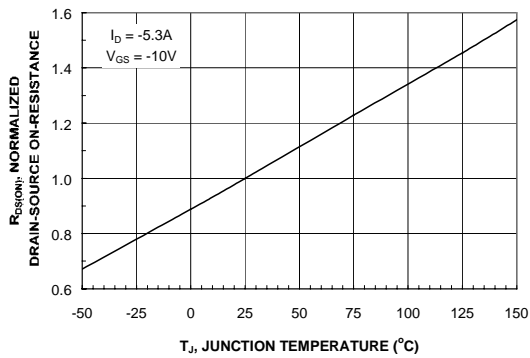

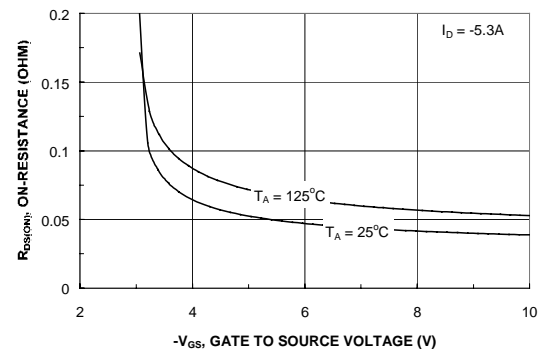**Figure 3. On-Resistance Variation with Temperature.**

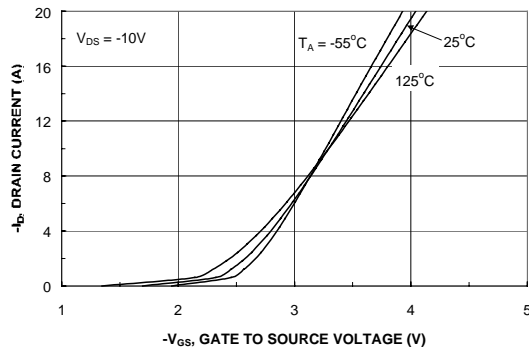**Figure 4. On-Resistance Variation with Gate-to-Source Voltage.**
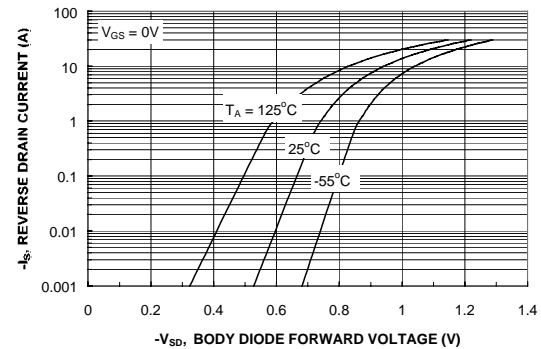

Figure 5. Transfer Characteristics.

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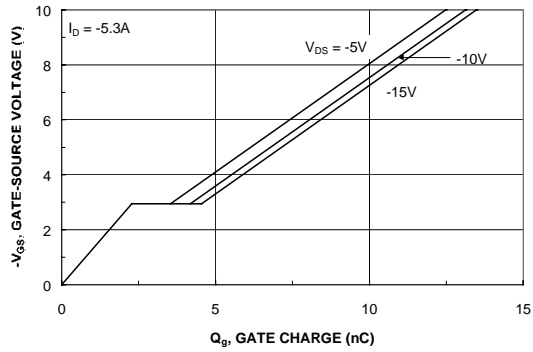
Typical Characteristics

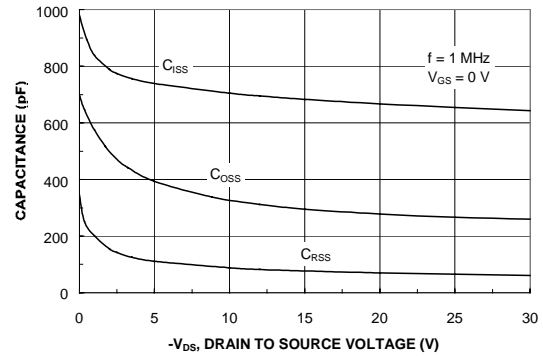Figure 7. Gate Charge Characteristics.
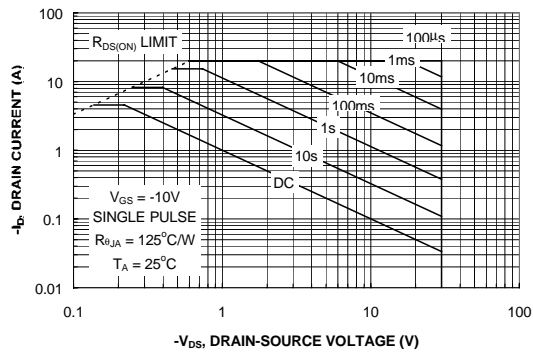

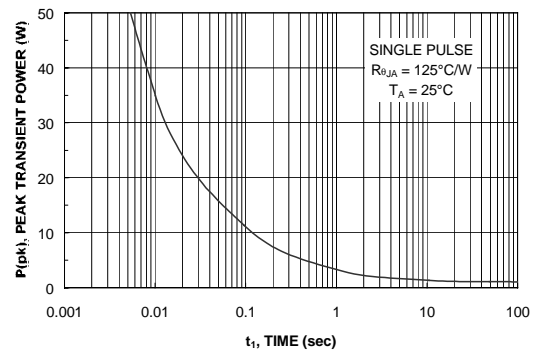Figure 8. Capacitance Characteristics.

Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.