

FDC6305N

Dual N-Channel 2.5V Specified PowerTrench™ MOSFET

General Description

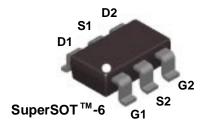
These N-Channel low threshold 2.5V specified MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance and yet maintain low gate charge for superior switching performance.

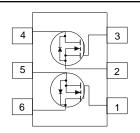
Applications

- Load switch
- DC/DC converter
- Motor driving

Features

- 2.7 A, 20 V. $R_{DS(ON)} = 0.08 \Omega$ @ $V_{GS} = 4.5 V$ $R_{DS(ON)} = 0.12 \Omega$ @ $V_{GS} = 2.5 V$
- Low gate charge (3.5nC typical).
- · Fast switching speed.
- High performance trench technology for extremely low $R_{\scriptscriptstyle DS(ON)}$.
- SuperSOTTM-6 package: small footprint (72% smaller than standard SO-8); low profile (1mm thick).





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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		<u>+</u> 8	V	
I _D	Drain Current - Continuous	(Note 1a)	2.7	А	
	- Pulsed		8		
P _D	Power Dissipation for Single Operation	(Note 1a)	0.96	W	
		(Note 1b)	0.9		
		(Note 1c)	0.7		
T _J , T _{stg}	Operating and Storage Junction Temperature Range		-55 to +150	°C	
Therma	I Characteristics				
Roia	Thermal Resistance Junction-to-Ambient	(Note 1a)	130	∘C/W	

Package Outlines and Ordering Information

Thermal Resistance, Junction-to-Case

Device Marking	Device	Reel Size	Tape Width	Quantity
.305	FDC6305N	7"	8mm	3000 units

(Note 1)

 $R_{\theta^{JC}}$

°C/W

Symbol	Parameter	Test Conditions	Min	Тур	Max	Units
Off Char	acteristics					
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$	20			V
ΔBVDSS ΔT _J	Breakdown Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		14		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 16 \text{ V}, V_{GS} = 0 \text{ V}$			1	μΑ
I _{GSSF}	Gate-Body Leakage Current, Forward	V _{GS} = 8 V, V _{DS} = 0 V			100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = -8 \text{ V}, V_{DS} = 0 \text{ V}$			-100	nA
On Char	acteristics (Note 2)					
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	0.4	0.9	1.5	V
$\frac{\Delta VGS(th)}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μ A, Referenced to 25°C		-2.7		mV/°C
R _{DS(on)}	Static Drain-Source On-Resistance	$V_{GS} = 4.5$, $I_D = 2.7$ A $V_{GS} = 4.5$ $I_D = 2.7$ A, $T_J = 125$ °C $V_{GS} = 2.5$ V, $I_D = 2.2$ A		0.060 0.095 0.085	0.080 0.128 0.120	Ω
I _{D(on)}	On-State Drain Current	V _{GS} = 4.5 V, V _{DS} = 5 V	6			Α
g _{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_{D} = 2.7 \text{ A}$		8		S
Dvnamio	Characteristics					
C _{iss}	Input Capacitance	$V_{DS} = 10 \text{ V}, V_{GS} = 0 \text{ V},$		310		pF
C _{oss}	Output Capacitance	f = 1.0 MHz			pF	
C _{rss}	Reverse Transfer Capacitance			40		pF
Switchir	ng Characteristics (Note 2)					
t _{d(on)}	Turn-On Delay Time	$V_{DD} = 10 \text{ V}, I_D = 1 \text{ A},$		5	15	ns
t _r	Turn-On Rise Time	$V_{GS} = 4.5 \text{ V}, R_{GEN} = 6 \Omega$		8.5	17	ns
t _{d(off)}	Turn-Off Delay Time			11	20	ns
t _f	Turn-Off Fall Time			3	10	ns
$\overline{Q_g}$	Total Gate Charge	$V_{DS} = 10 \text{ V}, I_D = 2.7 \text{ A},$		3.5	5	nC
$\overline{Q_gs}$	Gate-Source Charge	V _{GS} = 4.5 V		0.55		nC
Q_{gd}	Gate-Drain Charge			0.95		nC
Drain-Sc	ource Diode Characteristics an	d Maximum Ratings				
l _s	Maximum Continuous Drain-Source Did				0.8	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 0.8 \text{ A}$ (Note 2)		0.77	1.2	V

Notes:

1. R_{BJA} 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_{BJC} is guaranteed by design while R_{BCA} is determined by the user's board design. Both devices are assumed to be operating and sharing the dissipated heat energy equally.



a) 130 °C/W when mounted on a 0.125 in² pad of 2 oz. copper.



b) 140 °C/W when mounted on a 0.005 in² pad of 2 oz. copper.



c) 180 °C/W on a minimum mounting pad.

Scale 1: 1 on letter size paper

2. Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2.0%

Typical Characteristics

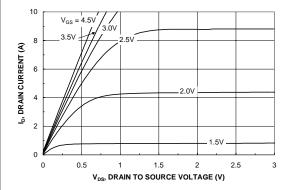


Figure 1. On-Region Characteristics.

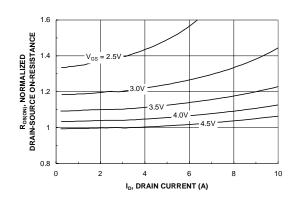


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

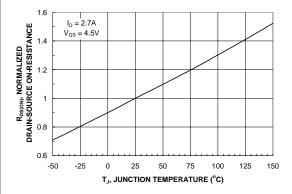


Figure 3. On-Resistance Variation with Temperature.

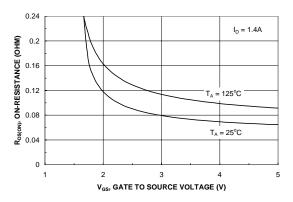


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

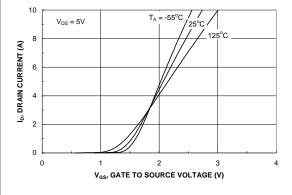


Figure 5. Transfer Characteristics.

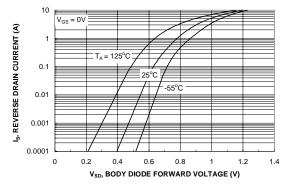
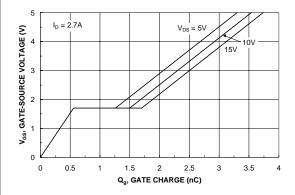


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics (continued)



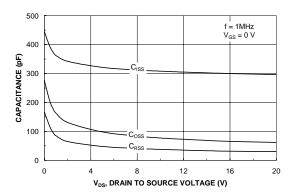
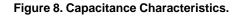
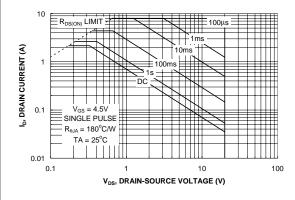


Figure 7. Gate-Charge Characteristics.





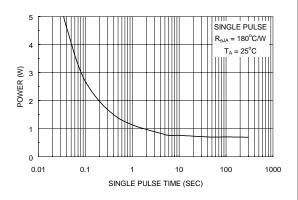


Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

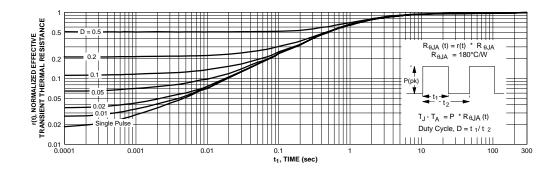


Figure 11. Transient Thermal Response Curve.

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



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