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FDC6561AN

Dual N-Channel Logic Level PowerTrench™ MOSFET

General Description

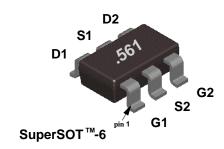
These N-Channel Logic Level MOSFETs are produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain low gate charge for superior switching performance.

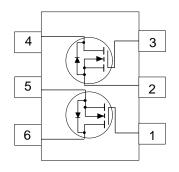
These devices are well suited for all applications where small size is desireable but especially low cost DC/DC conversion in battery powered systems.

Features

- 2.5 A, 30 V. $R_{DS(ON)} = 0.095 \Omega$ @ $V_{GS} = 10 V$ $R_{DS(ON)} = 0.145 \Omega$ @ $V_{GS} = 4.5 V$
- Very fast switching.
- Low gate charge (2.1nC typical).
- SuperSOT[™]-6 package: small footprint (72% smaller than standard SO-8); low profile (1mm thick).







Absolute Maximum Ratings

 $T_A = 25$ °C unless otherwise note

Symbol	Parameter		Ratings	Units
V _{DSS}	Drain-Source Voltage Gate-Source Voltage - Continuous		30	
$V_{\rm GSS}$			±20	V
I _D	Drain Current - Continuous		2.5	А
	- Pulsed		10	
P _D	Maximum Power Dissipation	(Note 1a)	0.96	W
		(Note 1b)	0.9	
		(Note 1c)	0.7	
T_J , T_{STG}	Operating and Storage Temperature Range		-55 to 150	.€
THERMA	L CHARACTERISTICS	·		·
$R_{\theta JA}$	Thermal Resistance, Junction-to-Am	nbient (Note 1a)	130	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Note 1)		60	°C/W

Symbol	Parameter	Conditions		Min	Тур	Max	Units
OFF CHAR	ACTERISTICS	•		•	•	•	
BV _{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0 \text{ V}, I_{D} = 250 \mu\text{A}$		30			V
$\Delta BV_{DSS}/\Delta T_{J}$	Breakdown Voltage Temp. Coefficient	I _D = 250 μA, Referenced to 25 °C			23.6		mV/°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 24 V, V _{GS} = 0 V				1	μA
			T _J = 55 °C			10	μA
GSSF	Gate - Body Leakage, Forward	$V_{GS} = 20 \text{ V}, V_{DS} = 0 \text{ V}$	•			100	nA
GSSR	Gate - Body Leakage, Reverse	$V_{GS} = -20 \text{ V}, V_{DS} = 0 \text{ V}$				-100	nA
ON CHARA	CTERISTICS (Note 2)				•		
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$		1	1.8	3	V
$\Delta V_{GS(th)}/\Delta T_{J}$	Gate Threshold VoltageTemp.Coefficient	I _D = 250 μA, Referenced to 25 °C			-4		mV/°C
R _{DS(ON)}	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 2.5 \text{ A}$			0.082	0.095	Ω
()			T _J = 125 °C		0.122	0.152	•
		$V_{GS} = 4.5 \text{ V}, I_D = 2.0 \text{ A}$			0.113	0.145	*
D(on)	On-State Drain Current	$V_{GS} = 10 \text{ V}, V_{DS} = 5 \text{ V}$		10			Α
9 _{FS}	Forward Transconductance	$V_{DS} = 5 \text{ V}, I_{D} = 2.5 \text{ A}$			5		S
DYNAMIC C	HARACTERISTICS						
C _{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, \ V_{GS} = 0 \text{ V},$ $f = 1.0 \text{ MHz}$			220		pF
C _{oss}	Output Capacitance				50		pF
C _{rss}	Reverse Transfer Capacitance				25		pF
SWITCHING	CHARACTERISTICS (Note 2)						
D(on)	Turn - On Delay Time	$V_{DD} = 5 \text{ V}, I_{D} = 1 \text{ A},$			6	12	ns
r	Turn - On Rise Time	$V_{GS} = 10 \text{ V}, R_{GEN} = 6 \Omega$			10	18	ns
D(off)	Turn - Off Delay Time				12	22	ns
f	Turn - Off Fall Time				2	6	ns
\mathbf{Q}_{g}	Total Gate Charge	$V_{DS} = 15 \text{ V}, I_{D} = 2.5 \text{ A}$			2.3	3.2	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 5 V			0.7	1	nC
Q_{gd}	Gate-Drain Charge				0.9	1.3	nC
DRAIN-SOU	RCE DIODE CHARACTERISTICS						
l _s	Continuous Source Diode Current					0.75	Α
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 0.75 \text{ A}$	(Note 2)		0.78	1.2	V

Notes

- 1. $R_{\mu i \lambda}$ 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. $R_{\mu i C}$ is guaranteed by design while $R_{\mu C A}$ is determined by the user's board design.
- 2. Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2.0%.



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



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



: 180°C/W on a minimum pad.

Typical Electrical Characteristics

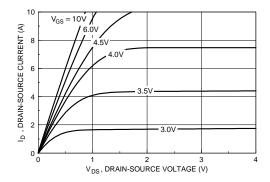


Figure 1. On-Region Characteristics.

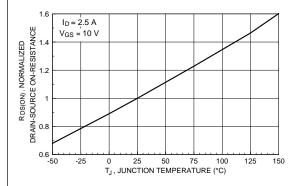


Figure 3. On-Resistance Variation with Temperature.

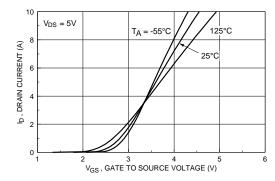


Figure 5.Transfer Characteristics.

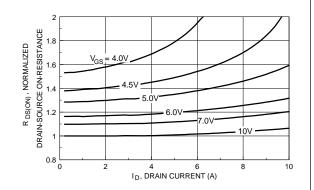


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

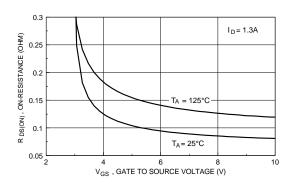


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

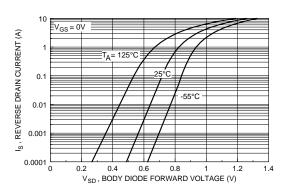


Figure 6. Body Diode Forward Voltage

Variation with Source Current
and Temperature.

Typical Electrical Characteristics (continued)

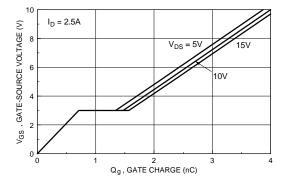


Figure 7. Gate Charge Characteristics.

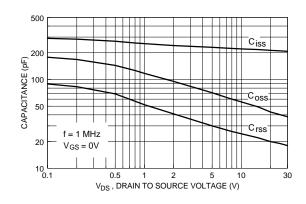
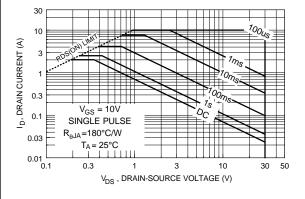


Figure 8. Capacitance Characteristics.



SINGLE PULSE - R_{gJA}=180°C/W T_A= 25°C - R_{gJA}=180°C/W T_A=180°C/W T_A=18

Figure 9. Maximum Safe Operating Area.

Figure 10. Single Pulse Maximum Power Dissipation.

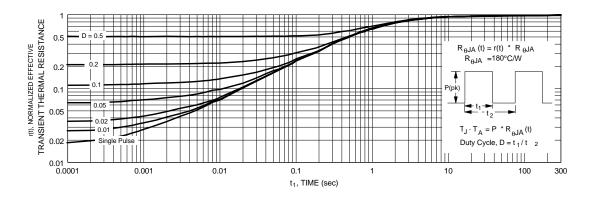


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.

Transient thermal response will change depending on the circuit board design.

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