

FDC655AN

Single N-Channel, Logic Level, PowerTrench™ MOSFET

General Description

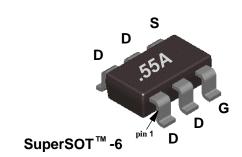
This N-Channel Logic Level MOSFET is produced using Fairchild Semiconductor's advanced PowerTrench process that has been especially tailored to minimize on-state resistance and yet maintain superior switching performance.

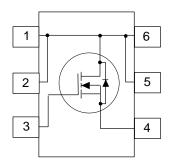
These devices are well suited for low voltage and battery powered applications where low in-line power loss and fast switching are required.

Features

- 6.3 A, 30 V. $R_{DS(ON)} = 0.027~\Omega~$ @ $V_{GS} = 10~V$ $R_{DS(ON)} = 0.035~\Omega~$ @ $V_{GS} = 4.5~V.$
- Fast switching.
- Low gate charge (typical 9 nC).
- SuperSOT[™]-6 package: small footprint (72% smaller than SO-8); low profile (1mm thick); pin compatible with TSOP-6.







Absolute Maximum Ratings T_a = 25°C unless otherwise note

Symbol	Parameter		FDC655AN	Units
V _{DSS}	Drain-Source Voltage		30	
V _{GSS}	Gate-Source Voltage - Continuous		±20	V
I _D	Drain Current - Continuous	(Note 1a)	6.3	А
	- Pulsed		20	
P_D	Maximum Power Dissipation	(Note 1a)	1.6	W
		(Note 1b)	0.8	
T_J, T_{STG}	Operating and Storage Temperature Range		-55 to 150	℃
THERM/	AL CHARACTERISTICS	·		
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	78	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	30	°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		mV /°C
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 24 V, V _{GS} = 0 V				1	μA
			$T_J = 55^{\circ}C$			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
	CTERISTICS (Note 2)	, 33			·	I.	
V _{GS(th)}	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_{D} = 250 \mu\text{A}$		1	1.6	3	V
$\Delta V_{GS(th)}/\Delta T_{J}$	Gate Threshold VoltageTemp.Coefficient	$I_D = 250 \mu\text{A}$, Referenced	to 25 °C		-4.2		mV /°C
R _{DS(ON)}	Static Drain-Source On-Resistance	$V_{GS} = 10 \text{ V}, I_D = 6.3 \text{ A}$			0.023	0.027	Ω
,			T _J = 125°C		0.035	0.045	Ì
		$V_{GS} = 4.5 \text{ V}, I_D = 5.5 \text{ A}$			0.029	0.035	
D(on)	On-State Drain Current	$V_{GS} = 10 \text{ V}, V_{DS} = 5 \text{ V}$		20			Α
9 _{FS}	Forward Transconductance	$V_{DS} = 10 \text{ V}, I_{D} = 6.3 \text{ A}$			4.5		S
OYNAMIC C	HARACTERISTICS	·					
C _{iss}	Input Capacitance	$V_{DS} = 15 \text{ V}, \ V_{GS} = 0 \text{ V},$ $f = 1.0 \text{ MHz}$			830		pF
Oss	Output Capacitance				185		pF
C _{rss}	Reverse Transfer Capacitance				80		pF
SWITCHING	CHARACTERISTICS (Note 2)						
D(on)	Turn - On Delay Time	$V_{DD} = 15 \text{ V}, \ I_{D} = 1 \text{ A},$ $V_{GS} = 10 \text{ V}, \ R_{GEN} = 6 \Omega$			6	12	ns
r	Turn - On Rise Time				10	18	ns
D(off)	Turn - Off Delay Time				18	29	ns
- (/) f	Turn - Off Fall Time				5	12	ns
Q .	Total Gate Charge	$V_{DS} = 15 \text{ V}, I_{D} = 6.3 \text{ A},$			9	13	nC
Q_{gs}	Gate-Source Charge	V _{GS} = 5 V			2.8		nC
Q _{qd}	Gate-Drain Charge				3.1		nC
3-	RCE DIODE CHARACTERISTICS	•		•	1		
s	Continuous Source Diode Current					1.3	Α
V _{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0 \text{ V}, I_{S} = 1.3 \text{ A}$ (Note 2)			0.73	1.2	V

Notes:

^{1.} $R_{g_{UA}}$ 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. $R_{g_{UC}}$ is guaranteed by design while $R_{g_{CA}}$ is determined by the user's board design.

a. 78°C/W when mounted on a minimum on a 1 in $^{\!2}$ pad of 2oz Cu in FR-4 board.

b. 156°C/W when mounted on a minimum pad of 2oz Cu in FR-4 board.

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

Typical Electrical Characteristics

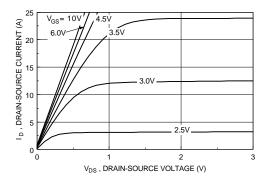


Figure 1. On-Region Characteristics.

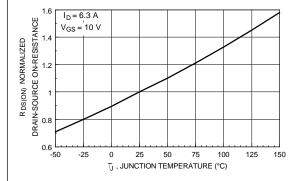


Figure 3. On-Resistance Variation with Temperature.

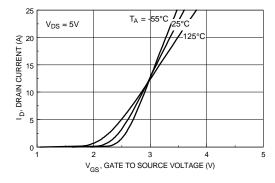


Figure 5. Transfer Characteristics.

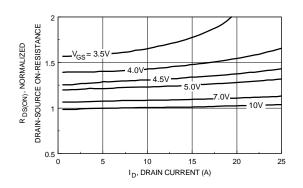


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

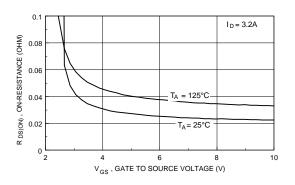


Figure 4. On-Resistance Variation with Gate-To-Source Voltage.

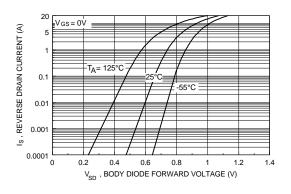


Figure 6. Body Diode Forward Voltage
Variation with Source
Current

Typical Electrical Characteristics

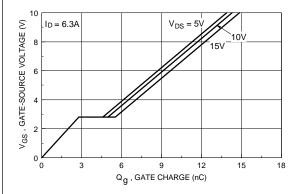


Figure 7. Gate Charge Characteristics.

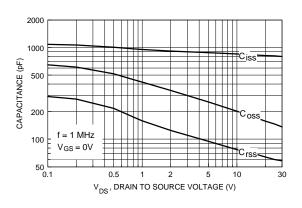


Figure 8. Capacitance Characteristics.

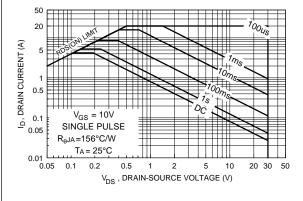


Figure 9. Maximum Safe Operating Area.

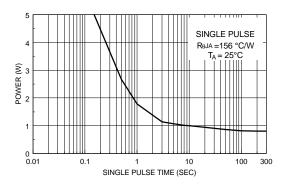


Figure 10. Single Pulse Maximum Power Dissipation.

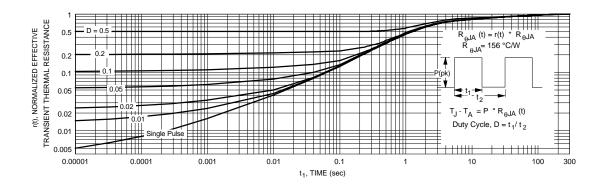


Figure 11. Transient Thermal Response Curve.

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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