

**SOT89 NPN SILICON PLANAR  
MEDIUM POWER HIGH VOLTAGE TRANSISTOR**

**FCX658A**

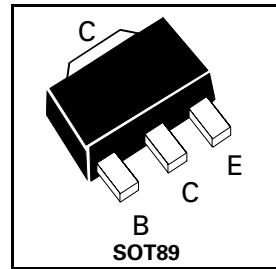
ISSUE 1 – NOVEMBER 2000

**FEATURES**

- \* 400 Volt  $V_{CE0}$
- \* 0.5 Amp continuous current
- \*  $P_{tot}=1$  Watt
- \* Optimised  $h_{fe}$  characterised upto 200mA

**APPLICATIONS**

- \* Telephone dialler circuits
- \* Hook switches for modems
- \* Predrivers within HID lamp ballasts
- \* (SLIC) Subscriber Line Interface Cards



Partmarking Detail - 65A

**ABSOLUTE MAXIMUM RATINGS.**

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	$V_{CBO}$	400	V
Collector-Emitter Voltage	$V_{CEO}$	400	V
Emitter-Base Voltage	$V_{EBO}$	5	V
Peak Pulse Current	$I_{CM}$	1	A
Continuous Collector Current	$I_C$	500	mA
Power Dissipation at $T_{amb}=25^{\circ}C$ derate above $25^{\circ}C$	$P_{tot}$	1 5.7	W mW/ $^{\circ}C$
Operating and Storage Temperature Range	$T_j:T_{stg}$	-55 to +150	$^{\circ}C$

# FCX658A

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	400	480		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	400	465		V	$I_C = 10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	7.8		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			100	nA	$V_{CB} = 320\text{V}$
Collector Cut-Off Current	$I_{CES}$			100	nA	$V_{CE} = 320\text{V}$
Emitter Cut-Off Current	$I_{EBO}$			100	nA	$V_{EB} = 4\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			0.165 0.125 0.2	V V V	$I_C = 20\text{mA}, I_B = 1\text{mA}$ $I_C = 50\text{mA}, I_B = 5\text{mA}^*$ $I_C = 100\text{mA}, I_B = 10\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.75	0.85	V	$I_C = 100\text{mA}, I_B = 10\text{mA}^*$
Base-Emitter Turn On Voltage	$V_{BE(on)}$		0.70	0.85	V	$I_C = 100\text{mA}, V_{CE} = 5\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	85 100 55 35	150 170 130 90			$I_C = 1\text{mA}, V_{CE} = 5\text{V}^*$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}^*$ $I_C = 100\text{mA}, V_{CE} = 5\text{V}^*$ $I_C = 200\text{mA}, V_{CE} = 10\text{V}^*$
Transition Frequency	$f_T$	50			MHz	$I_C = 20\text{mA}, V_{CE} = 20\text{V}$ $f = 20\text{MHz}$
Output Capacitance	$C_{obo}$			10	pF	$V_{CB} = 20\text{V}, f = 1\text{MHz}$
Switching times	$t_{on}$ $t_{off}$		130 3300		ns ns	$I_C = 100\text{mA}, V_{CE} = 100\text{V}$ $I_{B1} = 10\text{mA}, I_{B2} = -20\text{mA}$

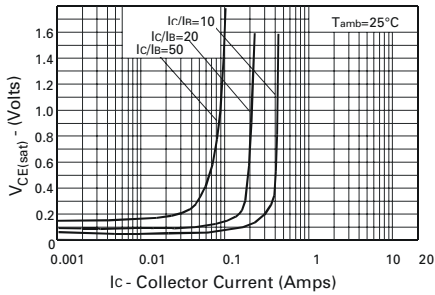
\* Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

### NB

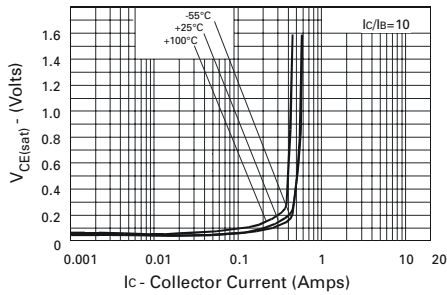
For high voltage applications the appropriate industry sector PCB guidelines should be considered with regard to voltage spacing between conductors.

# FCX658A

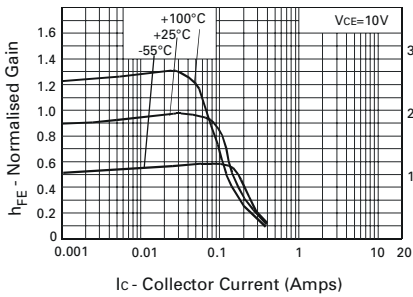
## TYPICAL CHARACTERISTICS



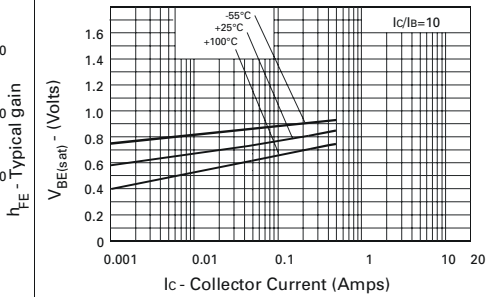
**$V_{CE(sat)}$  v  $I_C$**



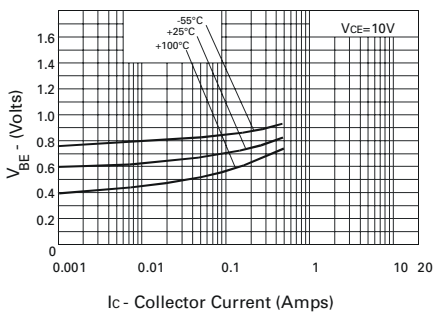
**$V_{CE(sat)}$  v  $I_C$**



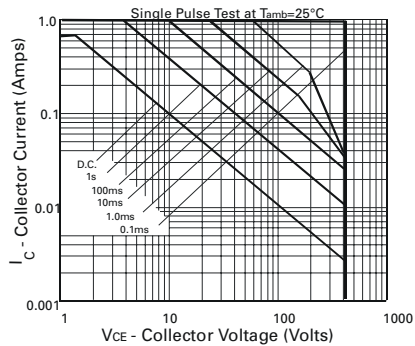
**$h_{FE}$  v  $I_C$**



**$V_{BE(sat)}$  v  $I_C$**



**$V_{BE(on)}$  v  $I_C$**

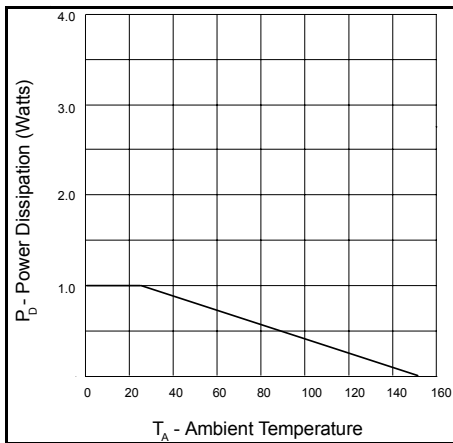


**Safe Operating Area**

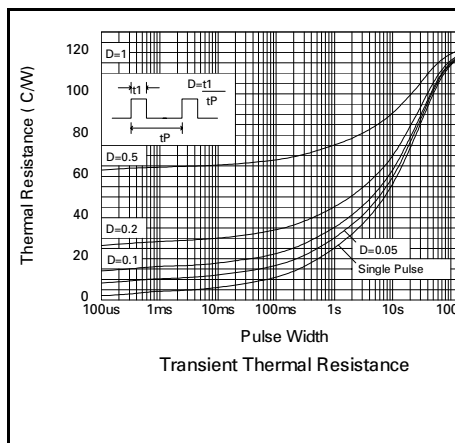
# FCX658

## THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	MAX.	UNIT
Thermal Resistance: Junction to Ambient <sub>1</sub> Junction to Case	$R_{th(j-amb)1}$ $R_{th(j-case)}$	125 10	°C/W °C/W



SOT89 (1W) Derating



Transient thermal resistance for a Zetex 1W SOT89 device mounted on a 15 mm x 15 mm ceramic substrate



Zetex plc.  
Fields New Road, Chadderton, Oldham, OL9-8NP, United Kingdom.  
Telephone: (44)161 622 4422 (Sales), (44)161 622 4444 (General Enquiries)  
Fax: (44)161 622 4420

Zetex GmbH  
Streitfeldstraße 19  
D-81673 München  
Germany  
Telefon: (49) 89 45 49 49 0  
Fax: (49) 89 45 49 49 49

Zetex Inc.  
47 Mall Drive, Unit 4  
Commack NY 11725  
USA  
Telephone: (631) 543-7100  
Fax: (631) 864-7630

Zetex (Asia) Ltd.  
3701-04 Metroplaza, Tower 1  
Hing Fong Road,  
Kwai Fong, Hong Kong  
Telephone: (852) 26100 611  
Fax: (852) 24250 494

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