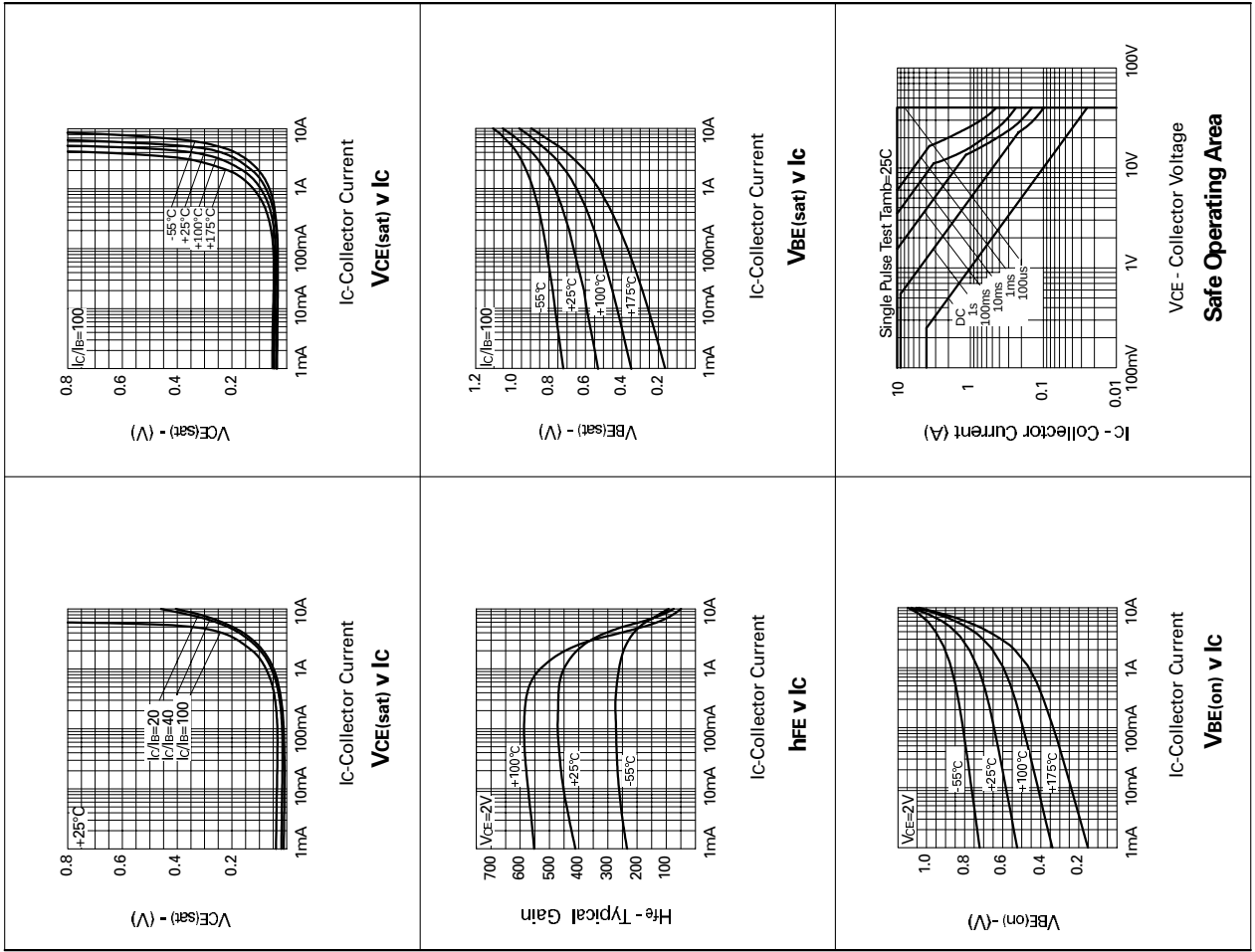


ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	150	190		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	V_{CES}	150	190		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	V_{CEO}	40	60		V	$I_C = 10\text{mA}$
Collector-Emitter Breakdown Voltage	V_{CEV}	150	190		V	$I_C = 100\mu\text{A}$, $V_{EB} = 1\text{V}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	8.8		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}		0.3	10	nA	$V_{CB} = 120\text{V}$
Emitter Cut-Off Current	I_{EBO}		0.3	10	nA	$V_{EB} = 4\text{V}$
Collector Emitter Cut-Off Current	I_{CES}		0.3	10	nA	$V_{CES} = 120\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		17 75 165	25 110 210	mV	$I_C = 0.2\text{A}$, $I_B = 10\text{mA}^*$ $I_C = 1\text{A}$, $I_B = 10\text{mA}^*$ $I_C = 4\text{A}$, $I_B = 100\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		920	1000	mV	$I_C = 4\text{A}$, $I_B = 100\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		825	950	mV	$I_C = 4\text{A}$, $V_{CE} = 2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	290 300 190 45	440 450 310 70			$I_C = 10\text{mA}$, $V_{CE} = 2\text{V}^*$ $I_C = 1\text{A}$, $V_{CE} = 2\text{V}^*$ $I_C = 4\text{A}$, $V_{CE} = 2\text{V}^*$ $I_C = 10\text{A}$, $V_{CE} = 2\text{V}^*$
Transition Frequency	f_T		155		MHz	$I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	C_{obo}		27	40	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}$
Switching Times	t_{on}		100		ns	$I_C = 4\text{A}$, $I_B = 40\text{mA}$, $V_{CC} = 10\text{V}$
	t_{off}		300		ns	$I_C = 4\text{A}$, $I_B = \pm 40\text{mA}$, $V_{CC} = 10\text{V}$

*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

TYPICAL CHARACTERISTICS



V_{CE} - Collector Voltage
Safe Operating Area

$V_{BE(on)}$ v I_C

I_C - Collector Current

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

I_C - Collector Current

$V_{CE(sat)}$ - (V)

$I_C/I_B = 100$

$+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$
 $+75^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+100^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+55^{\circ}\text{C}$

$V_{CE} = 2\text{V}$
 $+55^{\circ}\text{C}$
 $+25^{\circ}\text{C}$
 $+100^{\circ}\text{C}$
 $+175^{\circ}\text{C}$

DC
1s
10ms
100ns
100ns

Single Pulse Test $T_{amb} = 25^{\circ}\text{C}$

I_C - Collector Current (A)

V_{CE} - Collector Voltage

$V_{BE(sat)}$ v I_C

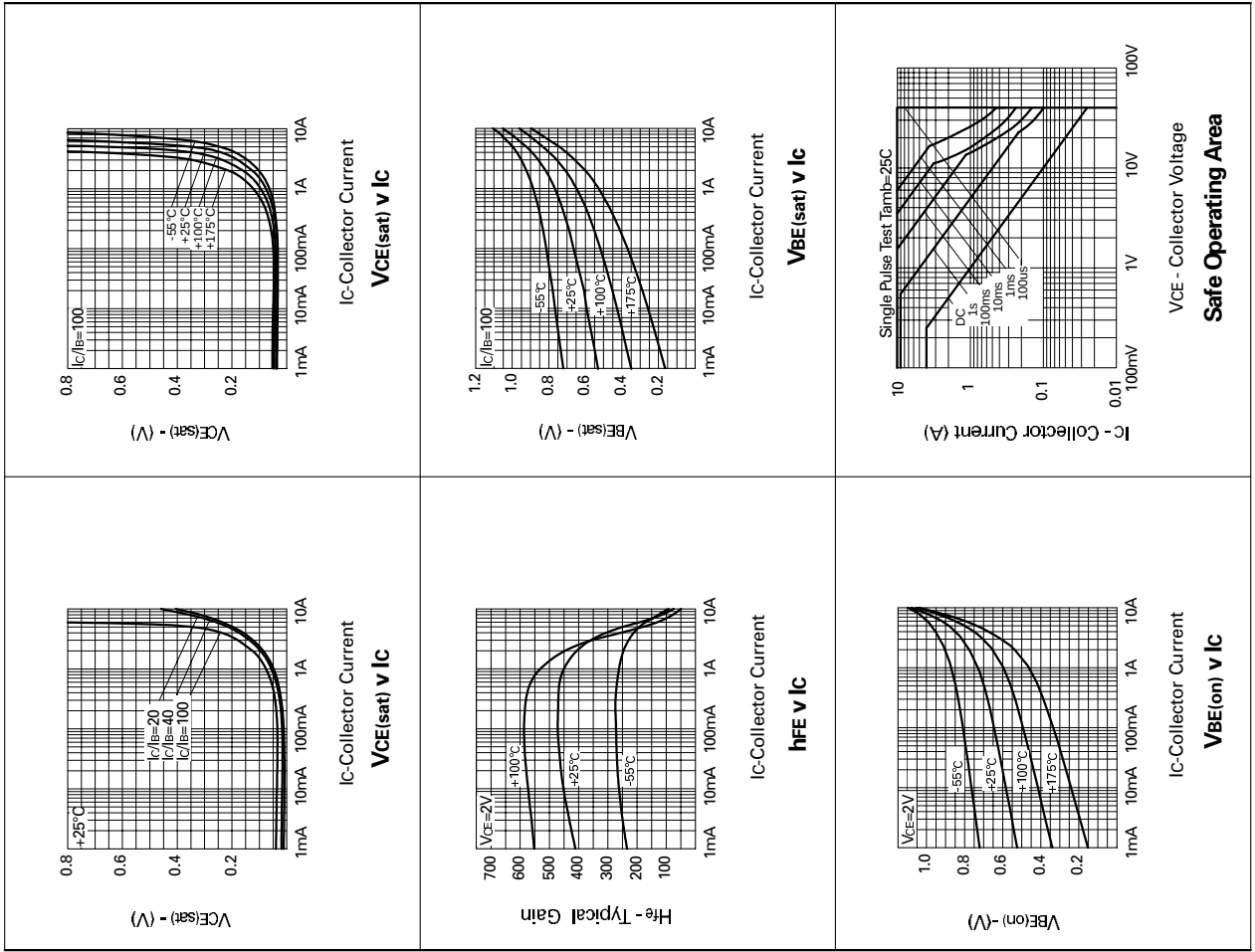
I_C - Collector Current

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

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	150	190		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	V_{CES}	150	190		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	V_{CEO}	40	60		V	$I_C = 10\text{mA}$
Collector-Emitter Breakdown Voltage	V_{CEV}	150	190		V	$I_C = 100\mu\text{A}$, $V_{EB} = 1\text{V}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	8.8		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}		0.3	10	nA	$V_{CB} = 120\text{V}$
Emitter Cut-Off Current	I_{EBO}		0.3	10	nA	$V_{EB} = 4\text{V}$
Collector Emitter Cut-Off Current	I_{CES}		0.3	10	nA	$V_{CES} = 120\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		17 75 165	25 110 210	mV	$I_C = 0.2\text{A}$, $I_B = 10\text{mA}^*$ $I_C = 1\text{A}$, $I_B = 10\text{mA}^*$ $I_C = 4\text{A}$, $I_B = 100\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		920	1000	mV	$I_C = 4\text{A}$, $I_B = 100\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		825	950	mV	$I_C = 4\text{A}$, $V_{CE} = 2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	290 300 190 45	440 450 310 70	1200		$I_C = 10\text{mA}$, $V_{CE} = 2\text{V}^*$ $I_C = 1\text{A}$, $V_{CE} = 2\text{V}^*$ $I_C = 4\text{A}$, $V_{CE} = 2\text{V}^*$ $I_C = 10\text{A}$, $V_{CE} = 2\text{V}^*$
Transition Frequency	f_T		155		MHz	$I_C = 50\text{mA}$, $V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	C_{obo}		27	40	pF	$V_{CB} = 10\text{V}$, $f = 1\text{MHz}$
Switching Times	t_{on}		100		ns	$I_C = 4\text{A}$, $I_B = 40\text{mA}$, $V_{CC} = 10\text{V}$
	t_{off}		300		ns	$I_C = 4\text{A}$, $I_B = \pm 40\text{mA}$, $V_{CC} = 10\text{V}$

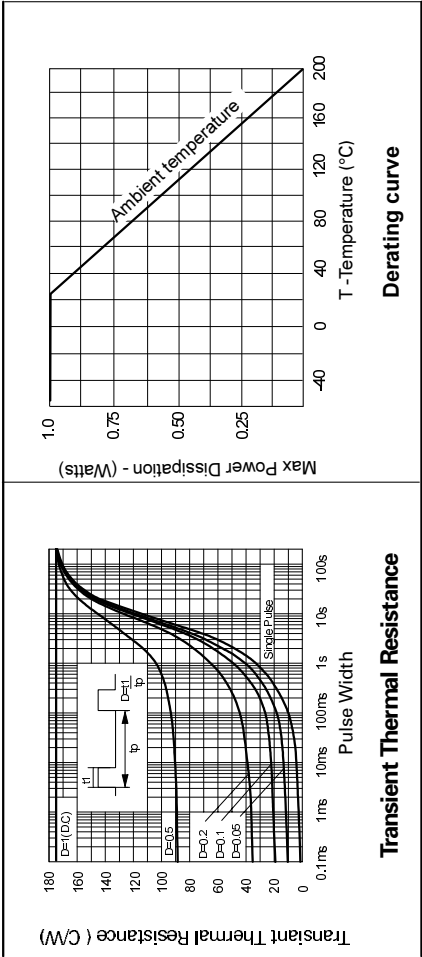
*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

TYPICAL CHARACTERISTICS

VCE - Collector Voltage
Safe Operating AreaVBE(on) v IC
IC-Collector CurrentVBE(sat) v IC
IC-Collector CurrenthFE v IC
IC-Collector CurrentVCE(sat) v IC
IC-Collector CurrentVCE(sat) v IC
IC-Collector Current

ZTX1051A

NPN SILICON PLANAR MEDIUM POWER
HIGH GAIN TRANSISTOR
ISSUE 3 – FEBRUARY 95
ZTX1051A



SPICE PARAMETERS

*ZETEX ZTX1051A Spice model Last revision 16/12/94

*.MODEL ZTX1051A NPN IS=1.35E-12 NF=1.0 BF=600 IKF=5.0 VAF=120

+ ISE=0.6E-13 NE=1.25 NR=1.0 BR=150 IKR=3 VAR=15

+ ISC=1.0E-10 NC=1.7 RB=0.1 RE=0.023 RC=0.010

+ CJC=90.36E-12 CJE=547.5E-12 MJC=0.385 MJE=0.357

+ VJC=0.5 VJE=0.741 TF=600E-12 TR=8E-9

*

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ZETEX

Zetex plc.
Fields New Road, Chadderton, Oldham, OL9-8NP, United Kingdom.
Telephone: (44)161-627 5105 (Sales), (44)161-627 4963 (General Enquiries)
Facsimile: (44)161-627 5467

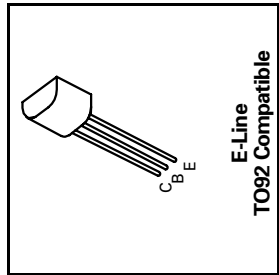
Zetex GmbH
Sreifeldstraße 19
D-81673 München
Telefon: (49) 89 45 49 49 0
Fax: (49) 89 45 49 49 49

Zetex Inc.
87 Modular Avenue
Commack NY11725
Telephone: (516) 543-7100
Fax: (516) 864-7630

Zetex (Asia) Ltd.
3510 Metrolaza, Tower 2
Hing Fong Road, Kwai Fong
Telephone: (852) 26100 611
Fax: (852) 24250 494

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ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	VALUE	UNIT
Collector-Base Voltage	V_{CB0}	150	V
Collector-Emitter Voltage	V_{CE0}	40	V
Emitter-Base Voltage	V_{EB0}	5	V
Peak Pulse Current	I_{CM}	10	A
Continuous Collector Current	I_C	4	A
Base Current	I_B	500	mA
Power Dissipation at $T_{amb}=25^{\circ}C$	P_{tot}	1	W
Operating and Storage Temperature Range	T_j, T_{stg}	-55 to +200	$^{\circ}C$

