

8961726 TEXAS INSTR (OPTO)

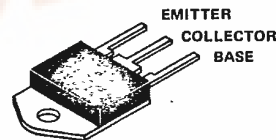
62C 37113 D

TIPL785, TIPL785A, TIPL790, TIPL790A
N-P-N MONOLITHIC DARLINGTON CONNECTED
SILICON POWER TRANSISTORS

OCTOBER 1982 - REVISED OCTOBER 1984

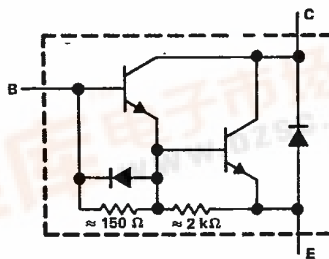
- **Rugged Epitaxial Planar Construction**
- **Designed For Low-Loss, High-Current, High-Speed Switching Applications**
- **t_{x0} Typically 320 ns at $I_C = 10\text{ A}$**
- **Operating Characteristics Fully Guaranteed at 100°C**
- **$I_{CES} < 1\text{ mA}$ at Maximum Rated V_{CE} at 100°C**
- **$V_{CE0(sus)}$:
TIPL785, TIPL790 . . . 120 V Min
TIPL785A, TIPL790A . . . 150 V Min**

TIPL785, TIPL785A . . . TO-218AA PACKAGE

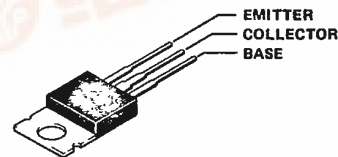


THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE MOUNTING TAB

device schematic



TIPL790, TIPL790A . . . TO-220AB PACKAGE



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absolute maximum ratings at 25°C case temperature (unless otherwise noted)

	TIPL785	TIPL785A	TIPL790	TIPL790A
Collector-base voltage	160 V	210 V	160 V	210 V
Collector-emitter voltage ($V_{BE} = 0$)	150 V	200 V	150 V	200 V
Collector-emitter voltage ($I_B = 0$)	120 V	150 V	120 V	150 V
Continuous device dissipation at (or below) 25°C case temperature	80 W		70 W	
Base-emitter voltage	8 V			
Continuous collector current	10 A			
Peak collector current (see Note 1)	15 A			
Peak parallel diode forward current (see Note 1)	10 A			
Operating collector junction and storage temperature range	− 65°C to 150°C			

NOTE 1: This value applies for $t_w = 2 \text{ ms}$, duty cycle $\leq 2 \%$

TIPL Devices

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N-P-N MONOLITHIC DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIPL785, TIPL785A			TIPL790, TIPL790A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CBO}$	$I_C = 1 \text{ mA}$, See Note 3	160			210			V
$V_{CEO(sust)}$	$I_C = 100 \text{ mA}$, $L = 25 \text{ mH}$, See Note 2	120			150			V
I_{CEV}	$V_{CE} = 150 \text{ V}$, $V_{BE} = -1.5 \text{ V to } -8 \text{ V}$			50				μA
	$V_{CE} = 200 \text{ V}$, $V_{BE} = -1.5 \text{ V to } -8 \text{ V}$					50		μA
I_{CES}	$V_{CE} = 150 \text{ V}$, $V_{BE} = 0$			50				μA
	$V_{CE} = 200 \text{ V}$, $V_{BE} = 0$					50		μA
	$V_{CE} = 150 \text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$			1				mA
	$V_{CE} = 200 \text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$					1		mA
I_{CEO}	$V_{CE} = 120 \text{ V}$, $I_B = 0$			50				μA
	$V_{CE} = 150 \text{ V}$, $I_B = 0$					50		μA
I_{EBO}	$V_{EB} = 5 \text{ V}$, $I_C = 0$			4			4	mA
h_{FE}	$V_{CE} = 5 \text{ V}$, $I_C = 500 \text{ mA}$, See Notes 3 and 4	60		500	60		500	
$V_{CE(sat)}$	$I_C = 4 \text{ A}$, $I_B = 0.02 \text{ A}$, See Notes 3 and 4			1.2			1.2	V
	$I_C = 7 \text{ A}$, $I_B = 0.03 \text{ A}$, See Notes 3 and 4			1.5			1.5	V
	$I_C = 10 \text{ A}$, $I_B = 0.05 \text{ A}$, See Notes 3 and 4			2			2	V
	$I_C = 10 \text{ A}$, $I_B = 0.05 \text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4			2			2	V
	$I_C = 4 \text{ A}$, $I_B = 0.02 \text{ A}$, See Notes 3 and 4			1.8			1.8	V
$V_{BE(sat)}$	$I_C = 7 \text{ A}$, $I_B = 0.03 \text{ A}$, See Notes 3 and 4			1.9			1.9	V
	$I_C = 10 \text{ A}$, $I_B = 0.05 \text{ A}$, See Notes 3 and 4			2.2			2.2	V
	$I_C = 10 \text{ A}$, $I_B = 0.05 \text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4			2.1			2.1	V
	$I_C = 10 \text{ A}$, See Notes 3 and 4							V
V_F	$I_F = 10 \text{ A}$, See Notes 3 and 4			3			3	V
C_{obo}	$V_{CB} = 20 \text{ V}$, $I_E = 0$, $f = 0.1 \text{ MHz}$			90			90	pF
f_t	$I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ V}$, See Note 5			10			10	MHz

NOTES: 2. Inductive loop switching measurement.

3. These parameters are measured using pulse techniques pulse width = 300 μs , duty cycle = 2 %.

4. These parameters are measured with voltage-sensing contacts separated from the current-carrying contacts located within 3,2 mm (0.125 inches) from the device body.

5. To obtain f_t , the $|h_{fe}|$ response is extrapolated at the rate of -6 dB per octave from $f = 1 \text{ MHz}$ to the frequency at which $|h_{fe}| = 1$.

thermal characteristics

PARAMETER	TIPL785, TIPL785A			TIPL790, TIPL790A			UNIT
	MIN	TYP	MAX	MIN	TYP	MAX	
$R_{\theta JC}$			1.56			1.79	$^\circ\text{C/W}$

TIPL Devices



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inductive-load switching characteristics

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PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
t_{sl}	$I_C = 10\text{ A}, \quad I_{B1} = 0.05\text{ A}, \quad I_{B2} = -2.5\text{ A}$ $V_{BE(off)} = -5\text{ V}, \quad \text{See Figures 1, 2, 3 and 4}$	450	700		ns
t_{rv}		160	750		ns
t_{fi}		250	400		ns
t_{tl}		280	450		ns
t_{xo}		320	500		ns

PARAMETER MEASUREMENT INFORMATION

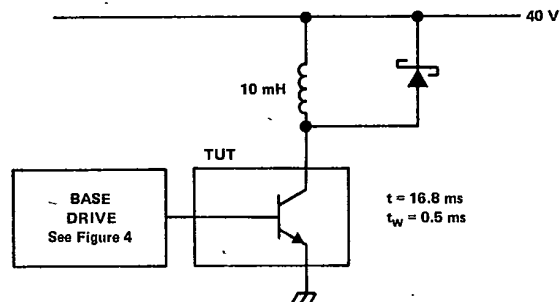


FIGURE 1. INDUCTIVE-LOAD SWITCHING — Collector Test Circuit

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N-P-N MONOLITHIC DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

TYPICAL CHARACTERISTICS

DELAY TIME
vs
COLLECTOR CURRENT

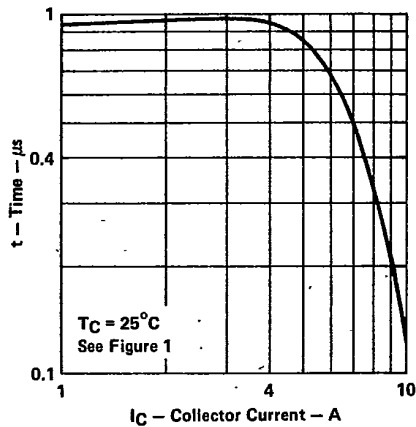


FIGURE 2

RISE TIME
vs
COLLECTOR CURRENT

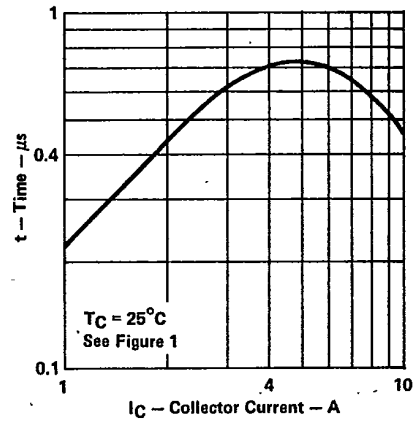


FIGURE 3

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

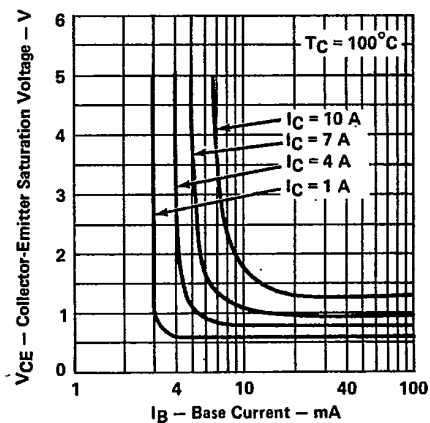


FIGURE 5

RECOMMENDED BASE DRIVE

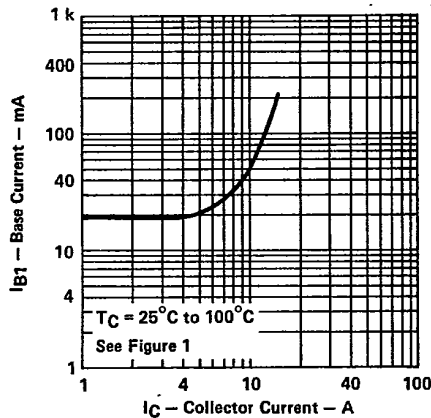


FIGURE 4

TIPL Devices



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N-P-N MONOLITHIC DARLINGTON-CONNECTED
SILICON POWER TRANSISTORS

TYPICAL CHARACTERISTICS

T-33-29

BASE-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

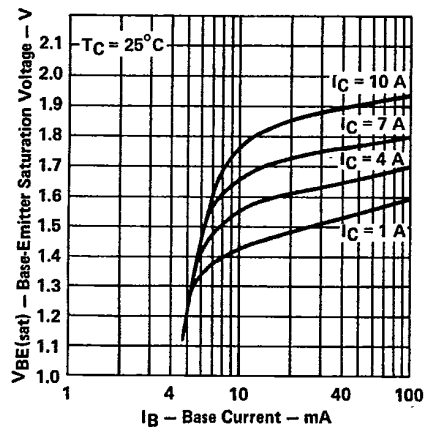


FIGURE 6

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

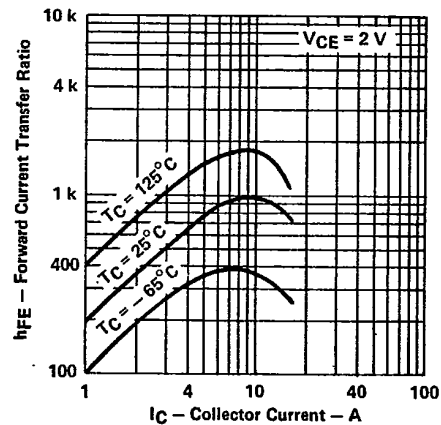


FIGURE 7

COLLECTOR CUTOFF CURRENT
vs
TEMPERATURE

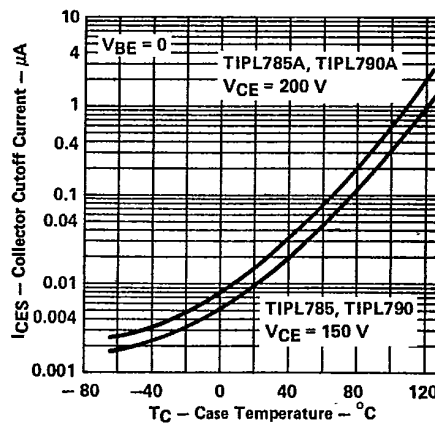


FIGURE 8

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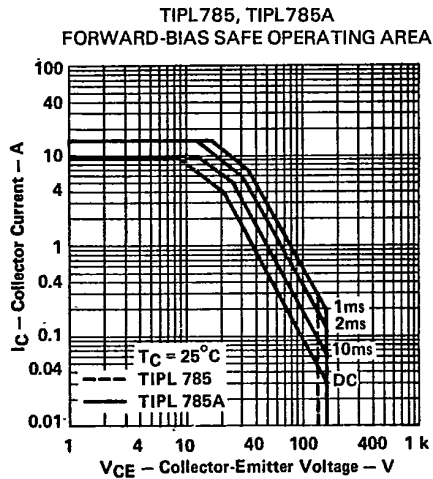
MAXIMUM SAFE OPERATING AREA

FIGURE 9

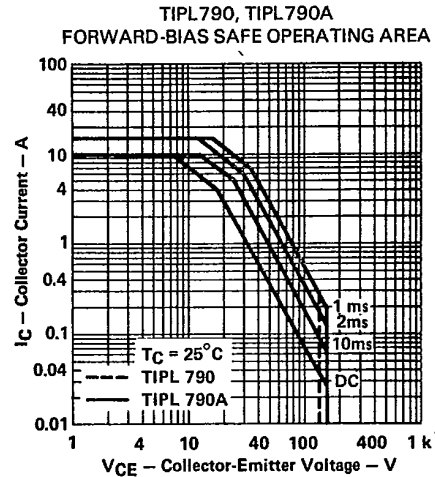


FIGURE 10

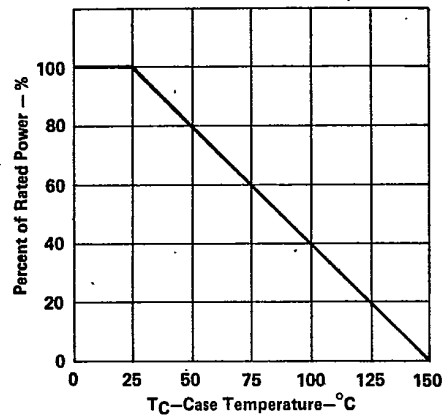
THERMAL INFORMATION**DISSIPATION DERATING CURVE**

FIGURE 11

TIPL Devices

