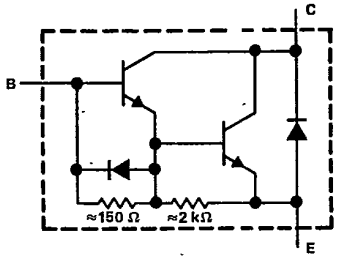
TIPL775, TIPL775A
N-P-N MONOLITHIC DARLINGTON-CONNECTED SILICON POWER TRANSISTORS

OCTOBER 1982 – REVISED OCTOBER 1984

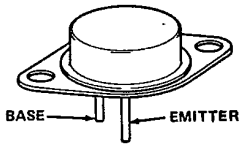
T-33-29

- Specifically Designed For Low-Loss, High-Current, High-Speed Switching Applications
- t_{xo} Typically 320 ns at I_C = 10 A
- Operating Characteristics Fully Guaranteed at 100°C
- I_{CES} < 1 mA at Maximum Rated V_{CE} at 100°C
- $V_{CEO(sus)}$: TIPL775 . . . 120 V Min
  TIPL775A . . . 150 V Min

device schematic



TO-3 PACKAGE



THE COLLECTOR IS IN ELECTRICAL CONTACT WITH THE CASE

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

	TIPL775	TIPL775A
Collector-base voltage	160 V	210 V
Collector-emitter voltage (V_{BE} = 0)	150 V	200 V
Collector-emitter voltage (I_B = 0)	120 V	150 V
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	
Continuous device dissipation at 25°C case temperature	100 W	
Operating collector junction and storage temperature range	−65°C to 200 °C	

NOTE 1: This value applies for t_w = 2 ms, duty cycle ≤ 2 %

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

PARAMETER	TEST CONDITIONS			TIPL775			TIPL775A			UNIT
				MIN	TYP	MAX	MIN	TYP	MAX	
$V_{(BR)CBO}$	I_C = 1 mA,	I_E = 0,	See Note 3	160			210			V
$V_{CEO(sus)}$	I_C = 100 mA,	L = 25 mH,	See Note 2	120			150			V
I_{CEV}	V_{CE} = 150 V,	V_{EB} = 1.5 V to 8 V			50					μA
	V_{CE} = 200 V,	V_{EB} = 1.5 V to 8 V						50		
I_{CES}	V_{CE} = 150 V,	V_{BE} = 0			50					μA
	V_{CE} = 200 V,	V_{BE} = 0						50		
	V_{CE} = 150 V,	V_{BE} = 0,	T_C = 100°C		1					mA
	V_{CE} = 200 V,	V_{BE} = 0,	T_C = 100°C					1		
I_{CEO}	V_{CE} = 120 V,	I_B = 0			50					μA
	V_{CE} = 150 V,	I_B = 0						50		
I_{EBO}	V_{EB} = 5 V,	I_C = 0			4			4		mA
$V_{CE(sat)}$	I_C = 4 A,	I_B = 0.02 A,	See Notes 3 and 4		1.2			1.2		V
	I_C = 7 A,	I_B = 0.03 A,	See Notes 3 and 4		1.5			1.5		
	I_C = 10 A,	I_B = 0.05 A,	See Notes 3 and 4		2			2		
	I_C = 10 A, See Notes 3 and 4	I_B = 0.05 A,	T_C = 100°C,		2			2		
$V_{BE(sat)}$	I_C = 4 A,	I_B = 0.02 A,	See Notes 3 and 4		1.8			1.8		V
	I_C = 7 A,	I_B = 0.03 A,	See Notes 3 and 4		1.9			1.9		
	I_C = 10 A,	I_B = 0.05 A,	See Notes 3 and 4		2.2			2.2		
	I_C = 10 A, See Notes 3 and 4	I_B = 0.05 A,	T_C = 100°C,		2.1			2.1		
V_F	I_F = 10 A,	See Notes 3 and 4			3			3		V
h_{FE}	V_{CE} = 5 V,	I_C = 500 mA,	See Notes 3 and 4	60		500	60		500	
f_t	V_{CE} = 10 V,	I_C = 500 mA,	See Note 5		10			10		MHz
C_{obo}	V_{CB} = 20 V,	I_E = 0,	f = 0.1 MHz		90			90		pF

NOTES: 2. Inductive loop switching measurement.
3. These parameters are measured using pulse techniques, pulse duration = 300 μs, duty cycle = 2 %.
4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts located within 3,2 mm (0.125 inch) 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 MHz to the frequency at which $|h_{fe}| = 1$.

thermal characteristics

PARAMETER	TIPL775			TIPL775A			UNIT
	MIN	TYP	MAX	MIN	TYP	MAX	
$R_{\theta JC}$			1.75			1.75	°C/W

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inductive-load switching characteristics

PARAMETER	TEST CONDITIONS	TIPL775			TIPL775A			UNIT
		MIN	TYP	MAX	MIN	TYP	MAX	
t_{si}	I_C = 10 A, I_{B1} = 0.05 A, I_{B2} = −2.5 A $V_{BE(off)}$ = −5 V, See Figure 1		450	700		450	700	ns
t_{rv}			160	250		160	250	ns
t_{fi}			250	400		250	400	ns
t_{ti}			280	450		280	450	ns
t_{xo}			320	500		320	500	ns

PARAMETER MEASUREMENT INFORMATION

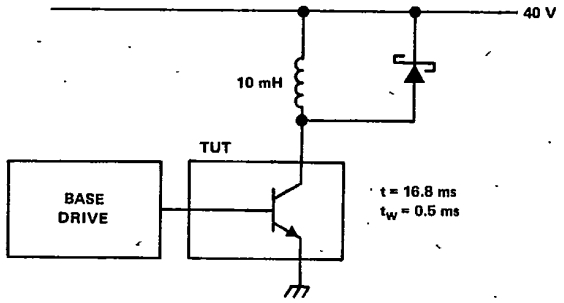

FIGURE 1. INDUCTIVE-LOAD SWITCHING — Collector Test Circuit

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TYPICAL CHARACTERISTICS

INDUCTIVE-LOAD SWITCHING
DELAY TIME

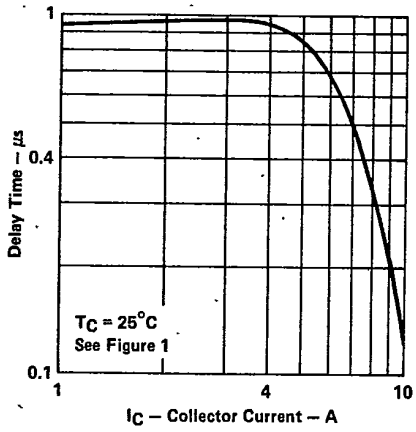

FIGURE 2

INDUCTIVE-LOAD SWITCHING
RISE TIME

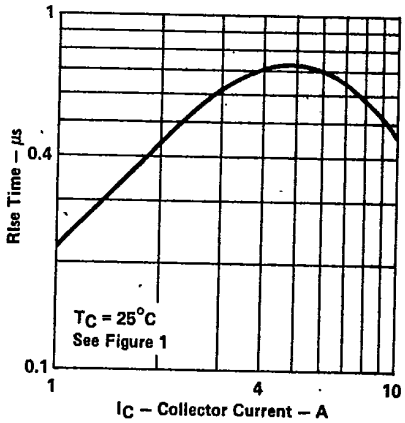

FIGURE 3

COLLECTOR-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

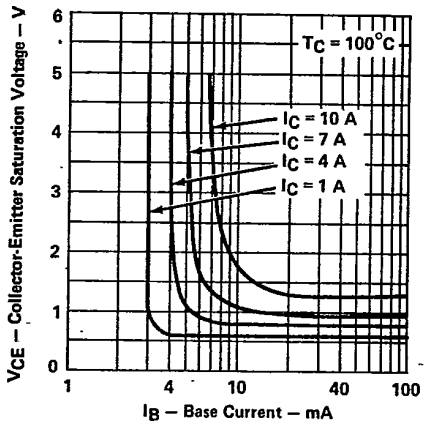

FIGURE 4

INDUCTIVE-LOAD SWITCHING
RECOMMENDED BASE DRIVE

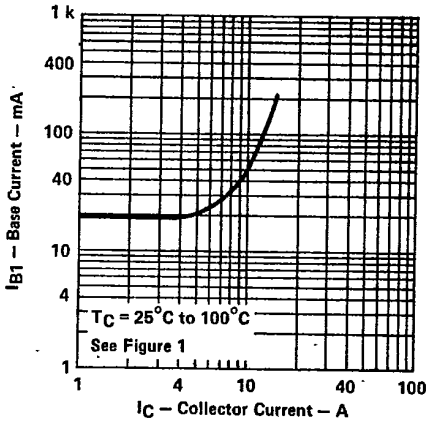

FIGURE 5

TIPL Devices

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TYPICAL CHARACTERISTICS

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BASE-EMITTER SATURATION VOLTAGE
vs
BASE CURRENT

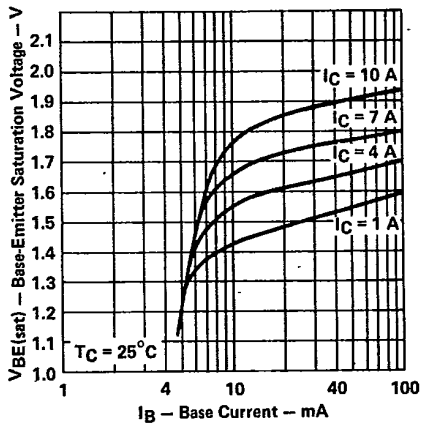

FIGURE 6

STATIC FORWARD CURRENT TRANSFER RATIO
vs
COLLECTOR CURRENT

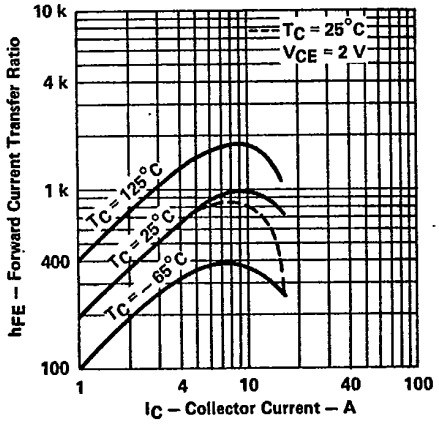

FIGURE 7

COLLECTOR CUTOFF CURRENT
vs
TEMPERATURE

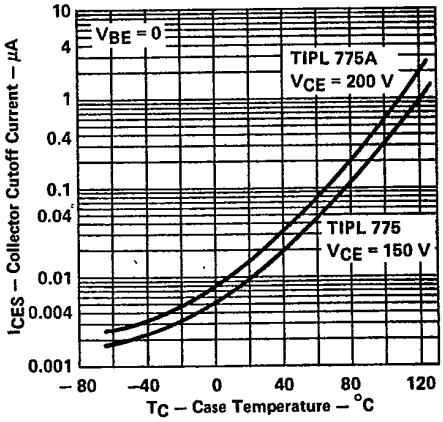

FIGURE 8

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MAXIMUM SAFE OPERATING AREA

FORWARD-BIAS SAFE OPERATING AREA

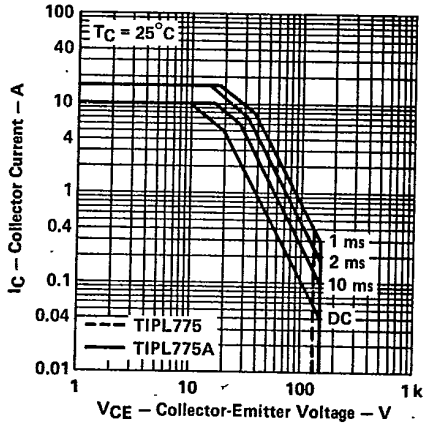

FIGURE 9

THERMAL INFORMATION

DISSIPATION DERATING CURVE

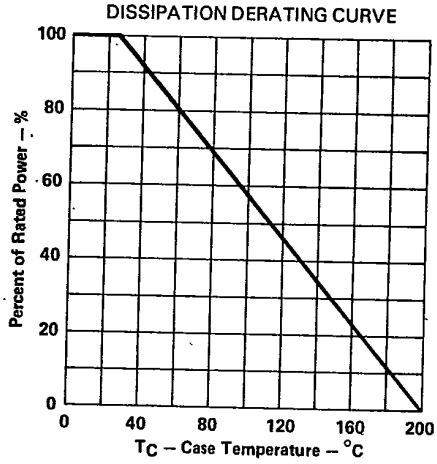

FIGURE 10

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