

8961726 TEXAS INSTR (OPTO)

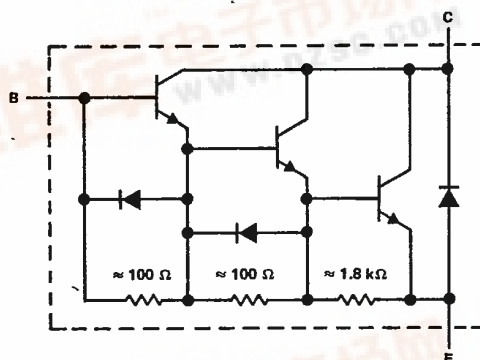
62C 37105 D

TIPL777, TIPL777A, TIPL777B
N-P-N SILICON HIGH VOLTAGE
ADVANCED POWER DARLINGTONS
 REVISED OCTOBER 1984

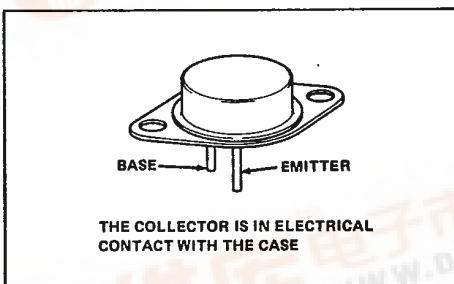
T-33-29

- 180 W at 25°C Case Temperature
- 20 A Continuous Collector Current
- 55 A Peak Collector Current
- Collector Emitter Voltage ... 1150 V
- $V_{CE(sus)}$ TIPL 777 910 V Min at 6 A
 TIPL 777A 860 V Min at 6 A
 TIPL 777B 970 V Min at 6 A
- $V_{CE(sat)}$ of 3 V Max at 15 A
- Typical t_f = 300 ns at 100°C
- All Major Parameters Guaranteed at 100°C
- Designed for High-Voltage Inductive Switching Applications;
 Removing Recovery Diode Makes TIPL777 Series Suitable for
 Bridge Inverter Designs

device schematic



TO-3 PACKAGE



TIPL Devices

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

	TIPL777	TIPL777A	TIPL777B
Collector-base voltage	950 V	1050 V	1150 V
Collector-emitter voltage ($R_{BE} = 100 \Omega$)	950 V	1050 V	1150 V
Collector-emitter voltage ($I_B = 0$)	600 V	700 V	800 V
Emitter-collector voltage ($I_B = 0$)	6 V		
Base-emitter voltage ($I_C = 0$)	6 V		
Continuous collector current	20 A		
Peak collector current (see Note 1)	55 A		
Continuous device dissipation at (or below) 25°C free-air temperature (see Figure 6)	180 W		
Operating collector junction and storage temperature range	-65°C to 200°C		

NOTE 1: These values apply for $t_W \leq 300 \mu s$, duty cycle $\leq 2\%$.

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TIPL777
N-P-N SILICON HIGH VOLTAGE
ADVANCED POWER DARLINGTONS

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

PARAMETER	TEST CONDITIONS	TIPL777			UNIT
		MIN	TYP	MAX	
$V_{CEX(sus)}$	$I_C = 6\text{ A}$, $I_B = 1\text{ A}$, See Figure 1a	710			V
$V_{CEO(sus)}$	$I_C = 0.1\text{ A}$, $L = 25\text{ mH}$, See Note 2	600			V
I_{CEO}	$V_{CE} = 600\text{ V}$, $I_B = 0$		50		μA
I_{CES}	$V_{CE} = 950\text{ V}$, $V_{BE} = 0$		0.1		mA
I_{CEV}	$V_{CE} = 950\text{ V}$, $V_{BE} = 0$, $T_C = 100^\circ\text{C}$		1		mA
I_{ECO}	$V_{CE} = 950\text{ V}$, $V_{BE} = -1.5\text{ V to } -6\text{ V}$		0.1		mA
I_{EBO}	$V_{EC} = 2\text{ V}$	7	15		mA
$V_{CE(sat)}$	$V_{EB} = 6\text{ V}$, $I_C = 0$		10		mV
	$I_C = 3\text{ A}$, $I_B = 60\text{ mA}$, See Notes 3 and 4		2		V
	$I_C = 10\text{ A}$, $I_B = 0.2\text{ A}$, See Notes 3 and 4		2.5		V
	$I_C = 15\text{ A}$, $I_B = 0.3\text{ A}$, See Notes 3 and 4		3		V
	$I_C = 20\text{ A}$, $I_B = 1\text{ A}$, See Notes 3 and 4		3.5		V
	$I_C = 15\text{ A}$, $I_B = 0.3\text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4		3		V
$V_{BE(sat)}$	$I_C = 3\text{ A}$, $I_B = 60\text{ mA}$, See Notes 3 and 4		3		V
	$I_C = 10\text{ A}$, $I_B = 0.2\text{ A}$, See Notes 3 and 4		3.5		V
	$I_C = 15\text{ A}$, $I_B = 0.3\text{ A}$, See Notes 3 and 4		4		V
	$I_C = 15\text{ A}$, $I_B = 0.3\text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4		4		V
C_{obo}	$V_{CE} = 20\text{ V}$, $I_E = 0$, $f = 0.1\text{ MHz}$	200			pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters are measured using pulse techniques, $t_w \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

4. These parameters are measured with voltage-sensing contacts separate from the current-carrying contacts and located within 3.2 mm (0.125 inches) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$		0.97		$^\circ\text{C/W}$

inductive-load switching characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIPL777			UNIT
		MIN	TYP	MAX	
t_s	$I_C = 15\text{ A}$, $V_{CE} = 300\text{ V}$, See Figure 1b, $I_{B2} = -1.5\text{ A}$, $T_C = 25^\circ\text{C}$		2.8		μs
t_r			0.5		μs
t_f			0.2		μs
t_{xo}			0.7		μs
t_s	$I_C = 15\text{ A}$, $V_{CE} = 300\text{ V}$, See Figure 1b, $I_{B2} = -1.5\text{ A}$, $T_C = 100^\circ\text{C}$		4.8		μs
t_r			1.5		μs
t_f			0.3		μs
t_{xo}			0.8		μs

TIPL Devices

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TIPL777A
N-P-N SILICON HIGH VOLTAGE
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electrical characteristics at 25°C case temperature (unless otherwise noted)

PARAMETER	TEST CONDITIONS	TIPL777A			UNIT
		MIN	TYP	MAX	
$V_{CEX(sus)}$	$I_C = 6\text{ A}$, $I_{B2} = 1\text{ A}$, See Figure 1a	860			V
$V_{CEO(sus)}$	$I_C = 0.1\text{ A}$, $L = 25\text{ mH}$, See Note 2	700			V
I_{CEO}	$V_{CE} = 700\text{ V}$, $I_B = 0$		50		μA
I_{CES}	$V_{CE} = 1050\text{ V}$, $V_{BE} = 0$		0.11		mA
	$V_{CE} = 1050\text{ V}$, $V_{BE} = 0$		1		mA
I_{CEV}	$V_{CE} = 1050\text{ V}$, $V_{BE} = -1.5\text{ V to } -6\text{ V}$		0.1		mA
I_{ECO}	$V_{EC} = 2\text{ V}$		7	15	mA
I_{EBO}	$V_{EB} = 6\text{ V}$, $I_C = 0$			10	mA
$V_{CE(sat)}$	$I_C = 2.5\text{ A}$, $I_B = 50\text{ mA}$, See Notes 3 and 4			2	V
	$I_C = 7.5\text{ A}$, $I_B = 0.15\text{ A}$, See Notes 3 and 4			2.5	V
	$I_C = 12.5\text{ A}$, $I_B = 0.25\text{ A}$, See Notes 3 and 4			3	V
	$I_C = 12.5\text{ A}$, $I_B = 0.25\text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4			3	V
$V_{BE(sat)}$	$I_C = 2.5\text{ A}$, $I_B = 50\text{ mA}$, See Notes 3 and 4			3	V
	$I_C = 7.5\text{ A}$, $I_B = 0.15\text{ A}$, See Notes 3 and 4			3.5	V
	$I_C = 12.5\text{ A}$, $I_B = 0.25\text{ A}$, See Notes 3 and 4			4	V
	$I_C = 12.5\text{ A}$, $I_B = 0.25\text{ A}$, $T_C = 100^\circ\text{C}$, See Notes 3 and 4			4	V
C_{obo}	$V_{CE} = 20\text{ V}$, $I_E = 0$, $f = 0.1\text{ MHz}$		200		pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters are measured using pulse techniques, $t_w \leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

4. These parameters are measured with voltage sensing-contacts separate from the current-carrying contacts and located within 3.2 mm (0.125 inches) from the device body.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$		0.97		$^\circ\text{C/W}$

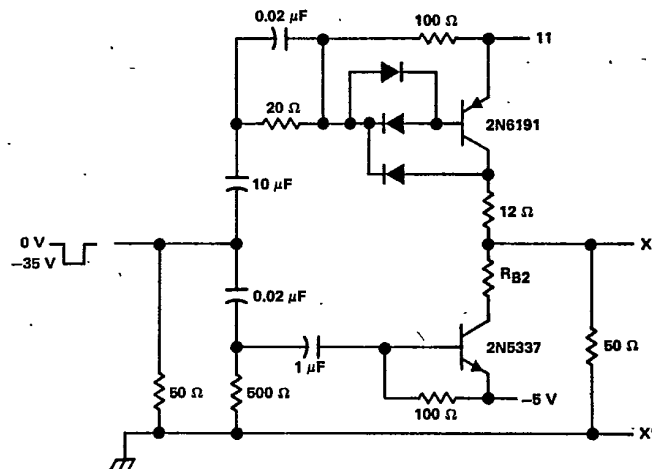
inductive-load switching characteristics

PARAMETER	TEST CONDITIONS	TIPL777A			UNIT
		MIN	TYP	MAX	
t_s	$I_C = 12.5\text{ A}$, $V_{CE} = 300\text{ V}$, See Figure 1b, $I_{B2} = -1.5\text{ A}$, $T_C = 25^\circ\text{C}$		3		μs
t_r			0.5		μs
t_f			0.2		μs
t_{xo}			0.7		μs
t_s	$I_C = 12.5\text{ A}$, $V_{CE} = 300\text{ V}$, See Figure 1b, $I_{B2} = -1.5\text{ A}$, $T_C = 100^\circ\text{C}$		5		μs
t_r			1.5		μs
t_f			0.5		μs
t_{xo}			2		μs

TIPL Devices

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PARAMETER MEASUREMENT INFORMATION



BASE DRIVE CIRCUIT

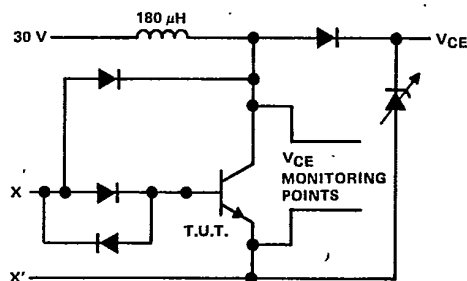


FIGURE 1a. $V_{CEX(sus)}$

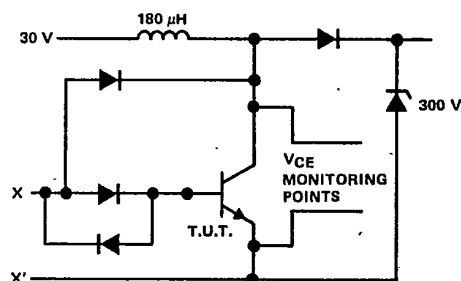


FIGURE 1b. INDUCTIVE-LOAD SWITCHING

NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r \leq 15 \text{ ns}$, $R_{in} \geq 10 \text{ M}\Omega$, $C_{in} \leq 11.5 \text{ pF}$.
B. Resistors must be noninductive types.
C. V_{CE} waveforms to be monitored within 3,2 mm of the device body.

FIGURE 1. INDUCTIVE-LOAD SWITCHING TEST CIRCUIT

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PARAMETER MEASUREMENT INFORMATION

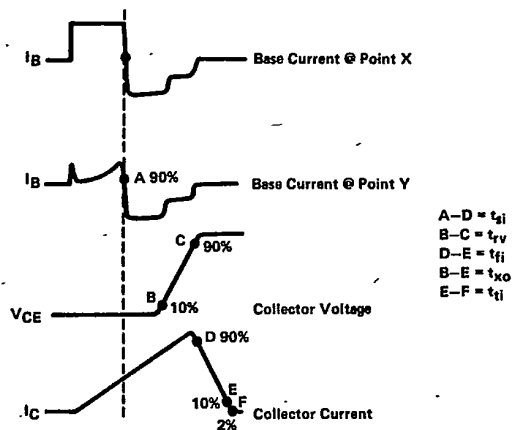


FIGURE 2. INDUCTIVE-LOAD SWITCHING WAVEFORMS

TYPICAL CHARACTERISTICS

COLLECTOR CUTOFF CURRENT
VS
TEMPERATURE

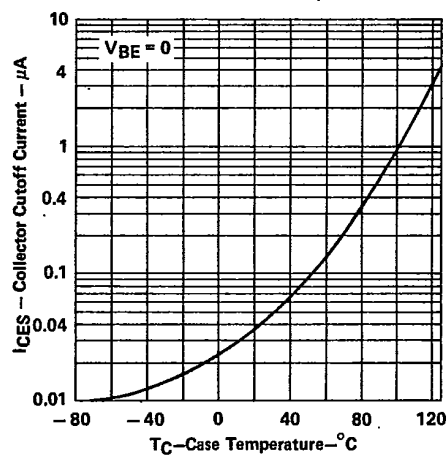


FIGURE 3

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MAXIMUM SAFE OPERATING AREA

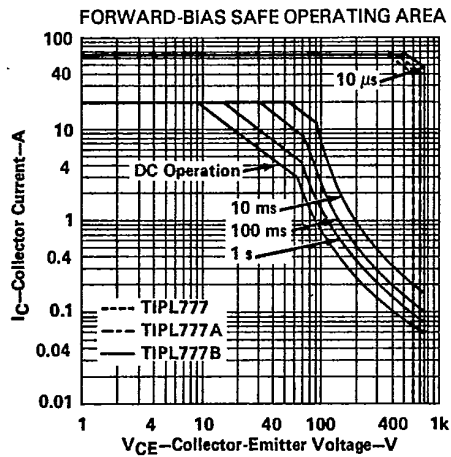


FIGURE 4

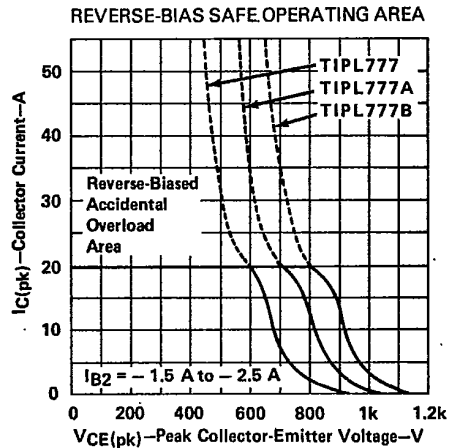


FIGURE 5

THERMAL INFORMATION

DISSIPATION DERATING CURVE

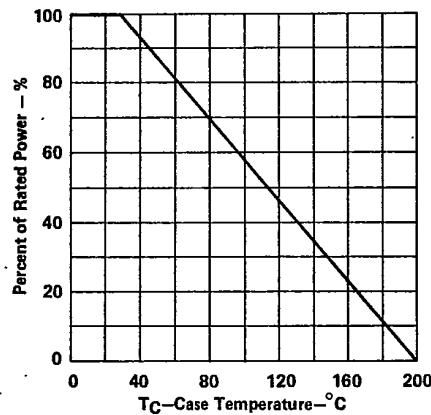


FIGURE 6

TIPL Devices

