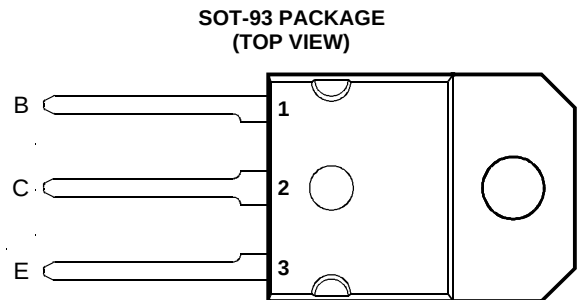


TIPL761B, TIPL761C NPN SILICON POWER TRANSISTORS

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MAY 1989 - REVISED MARCH 1997

- Rugged Triple-Diffused Planar Construction
- 4 A Continuous Collector Current
- Operating Characteristics Fully Guaranteed at 100°C
- 1200 Volt Blocking Capability
- 100 W at 25°C Case Temperature



Pin 2 is in electrical contact with the mounting base.

MDTRAA

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage ($I_E = 0$)	TIPL761B	V_{CBO}	1100	V
	TIPL761C		1200	
Collector-emitter voltage ($V_{BE} = 0$)	TIPL761B	V_{CES}	1100	V
	TIPL761C		1200	
Collector-emitter voltage ($I_B = 0$)	TIPL761B	V_{CEO}	500	V
	TIPL761C		550	
Emitter-base voltage		V_{EBO}	10	V
Continuous collector current		I_C	4	A
Peak collector current (see Note 1)		I_{CM}	8	A
Continuous device dissipation at (or below) 25°C case temperature		P_{tot}	100	W
Operating junction temperature range		T_j	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C

NOTE 1: This value applies for $t_p \leq 10$ ms, duty cycle $\leq 2\%$.

PRODUCT INFORMATION

Information is current as of publication date. Products conform to specifications in accordance with the terms of Power Innovations standard warranty. Production processing does not necessarily include testing of all parameters.



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

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
$V_{CE(sus)}$ Collector-emitter sustaining voltage	$I_C = 10\text{ mA}$ $L = 25\text{ mH}$ (see Note 2) TIPL761B TIPL761C	500 550			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 1100\text{ V}$ $V_{BE} = 0$ TIPL761B $V_{CE} = 1200\text{ V}$ $V_{BE} = 0$ TIPL761C $V_{CE} = 1100\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL761B $V_{CE} = 1200\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL761C			50 50 200 200	μA
I_{CEO} Collector cut-off current	$V_{CE} = 500\text{ V}$ $I_B = 0$ TIPL761B $V_{CE} = 550\text{ V}$ $I_B = 0$ TIPL761C			50 50	μA
I_{EBO} Emitter cut-off current	$V_{EB} = 10\text{ V}$ $I_C = 0$			1	mA
h_{FE} Forward current transfer ratio	$V_{CE} = 5\text{ V}$ $I_C = 0.5\text{ A}$ (see Notes 3 and 4)	20		60	
$V_{CE(sat)}$ Collector-emitter saturation voltage	$I_B = 0.4\text{ A}$ $I_C = 2\text{ A}$ $I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ (see Notes 3 and 4) $I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ $T_C = 100^\circ\text{C}$			1.0 2.5 5.0	V
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.4\text{ A}$ $I_C = 2\text{ A}$ $I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ (see Notes 3 and 4) $I_B = 0.6\text{ A}$ $I_C = 3\text{ A}$ $T_C = 100^\circ\text{C}$			1.2 1.4 1.3	V
f_t Current gain bandwidth product	$V_{CE} = 10\text{ V}$ $I_C = 0.5\text{ A}$ $f = 1\text{ MHz}$		12		MHz
C_{ob} Output capacitance	$V_{CB} = 20\text{ V}$ $I_E = 0$ $f = 0.1\text{ MHz}$		110		pF

NOTES: 2. Inductive loop switching measurement.

3. These parameters must be measured using pulse techniques, $t_p = 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

4. These parameters must be measured using voltage-sensing contacts, separate from the current carrying contacts.

thermal characteristics

PARAMETER	MIN	TYP	MAX	UNIT
$R_{\theta JC}$ Junction to case thermal resistance			1.25	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS [†]	MIN	TYP	MAX	UNIT
t_{SV} Voltage storage time	$I_C = 3\text{ A}$ $I_{B(on)} = 0.6\text{ A}$ (see Figures 1 and 2) $V_{BE(off)} = -5\text{ V}$			2.5	μs
t_{rV} Voltage rise time				300	ns
t_{fi} Current fall time				250	ns
t_{ti} Current tail time				150	ns
t_{xo} Cross over time				400	ns
t_{SV} Voltage storage time	$I_C = 3\text{ A}$ $I_{B(on)} = 0.6\text{ A}$ (see Figures 1 and 2) $V_{BE(off)} = -5\text{ V}$ $T_C = 100^\circ\text{C}$			3	μs
t_{rV} Voltage rise time				500	ns
t_{fi} Current fall time				250	ns
t_{ti} Current tail time				150	ns
t_{xo} Cross over time				750	ns

[†] Voltage and current values shown are nominal; exact values vary slightly with transistor parameters.

PRODUCT INFORMATION

The circuit diagram shows a 2N2904 BJT amplifier with a feedback loop and a clamp circuit. The input stage consists of a voltage divider (68 Ω and 270 Ω) connected to a 5V source. The base of the 2N2904 is biased by a 1 kΩ resistor connected to a 5V source and a 1 kΩ resistor connected to ground. The emitter is connected to ground through a 1 kΩ resistor. The collector is connected to a 33 Ω resistor, which is in series with a 33 Ω resistor connected to a 5V source. The output of the amplifier is connected to a 47 Ω resistor, which is in series with a 100 Ω resistor connected to ground. The output voltage is labeled $V_{BE(off)}$. A feedback loop is formed by a 33 Ω resistor connected from the output back to the base. A clamp circuit is connected to the output, consisting of a 180 μH inductor connected to a 5V source, a 1 kΩ resistor connected to ground, and a 1 kΩ resistor connected to the output. The clamp voltage is labeled $V_{clamp} = 400 V$. The circuit is labeled with various components: 2N2904, 2N2222, D45H11, D44H11, BY205-400, 5X BY205-400, 1 pF, 1 kΩ, 33 Ω, 47 Ω, 100 Ω, 180 μH, 5V, 0.02 μF, 68 Ω, 270 Ω, and $V_{BE(off)}$.

Adjust pw to obtain I_C

For $I_C < 6 A$ $V_{CC} = 50 V$
 For $I_C \geq 6 A$ $V_{CC} = 100 V$

The diagram illustrates the timing characteristics of a BJT switching circuit. It consists of three vertically aligned waveforms sharing a common time axis.

- Base Current (I_B):** Starts at zero, rises to a saturation level $I_{B(on)}$ at point A (90%), remains constant, and then falls back to zero at point C (90%).
- Collector Voltage (V_{CE}):** Starts at a high level, drops to a low level at point B (10%), remains constant, and then rises back to the high level at point D (90%).
- Collector Current (I_C):** Starts at zero, rises to a saturation level $I_{C(on)}$ at point E (10%), remains constant, and then falls back to zero at point F (2%).

Key time intervals are defined by points A through F:

- $A - B = t_{SV}$ (Storage time)
- $B - C = t_{rV}$ (Fall time of collector voltage)
- $D - E = t_{fi}$ (Fall time of collector current)
- $E - F = t_{ti}$ (Turn-off time)
- $B - E = t_{xO}$ (Total turn-off time)

Figure 2. Inductive-Load Switching Waveforms

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TYPICAL CHARACTERISTICS

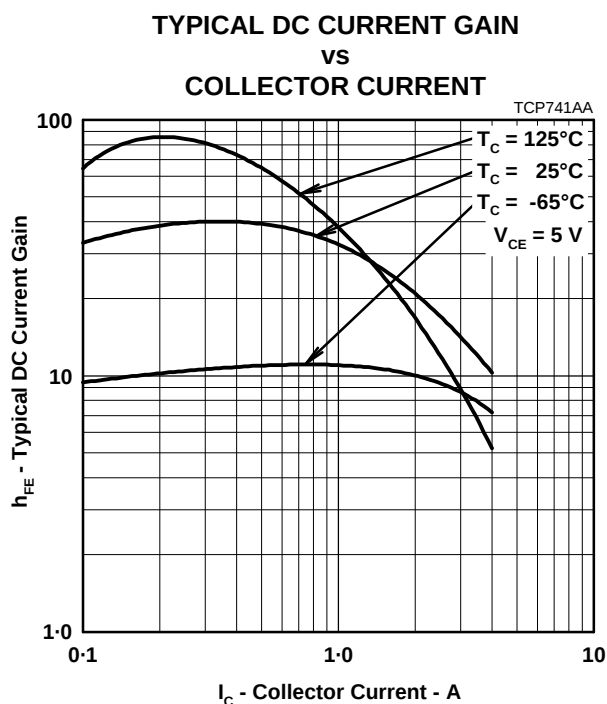


Figure 3.

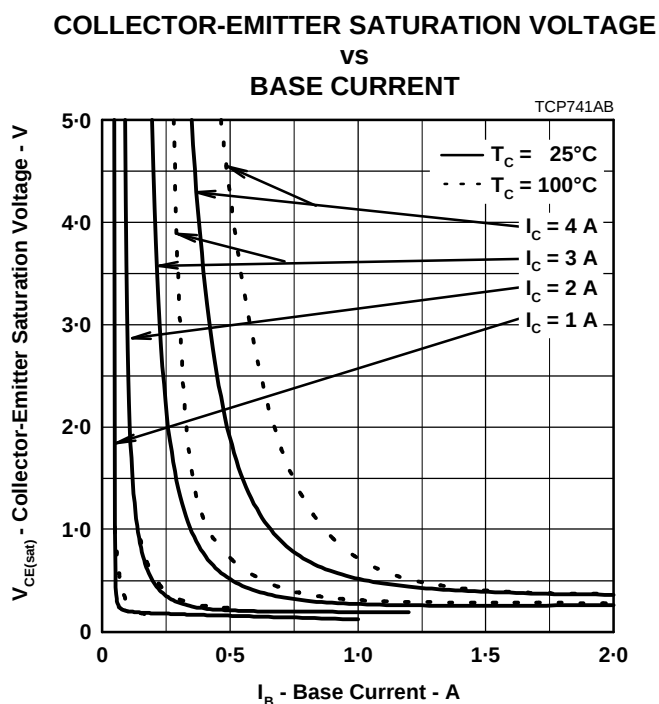


Figure 4.

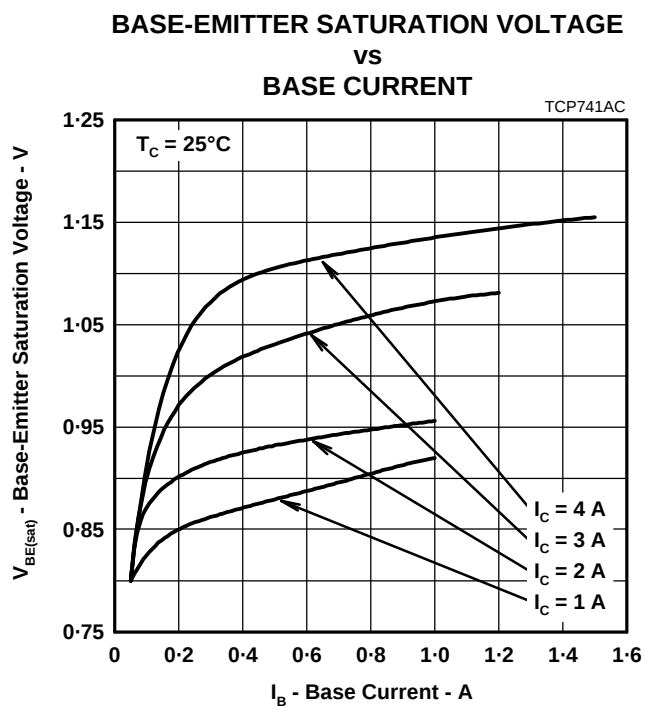


Figure 5.

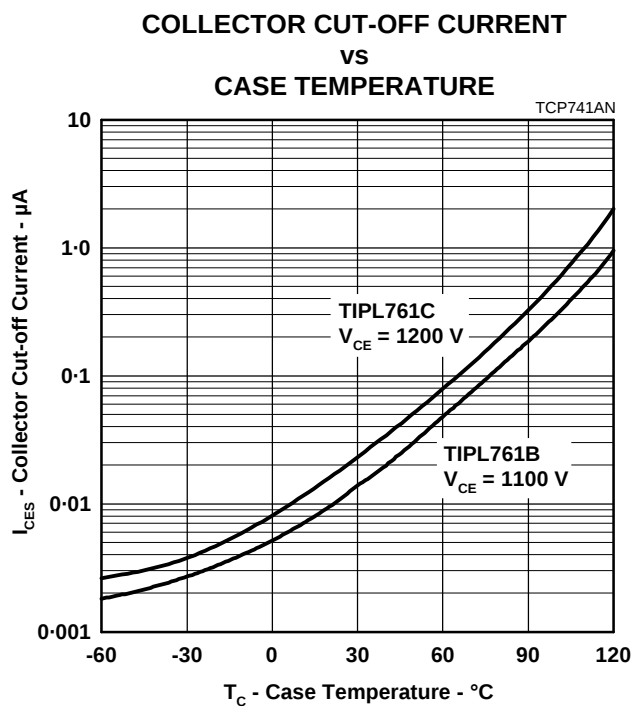


Figure 6.

MAXIMUM SAFE OPERATING REGIONS

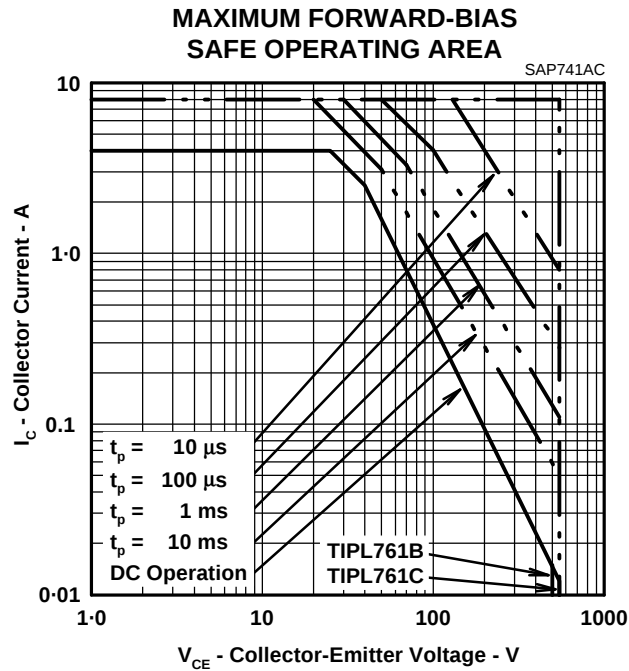


Figure 7.

THERMAL INFORMATION

THERMAL RESPONSE JUNCTION TO CASE VS POWER PULSE DURATION

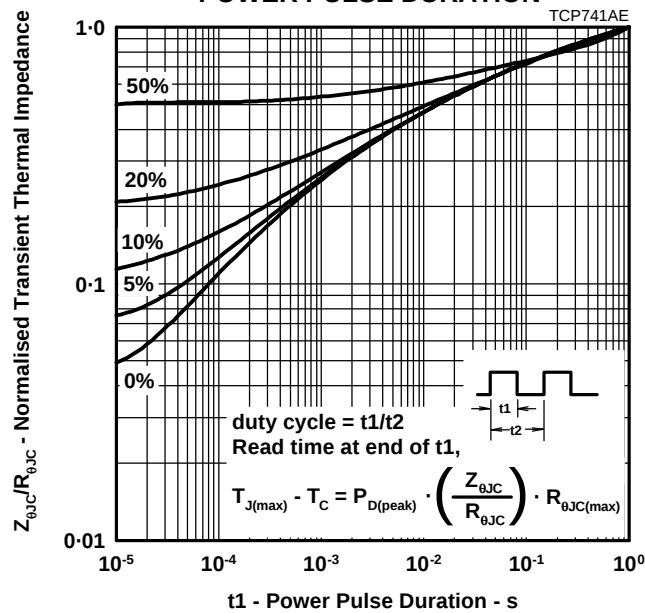


Figure 8.

TIPL761B, TIPL761C

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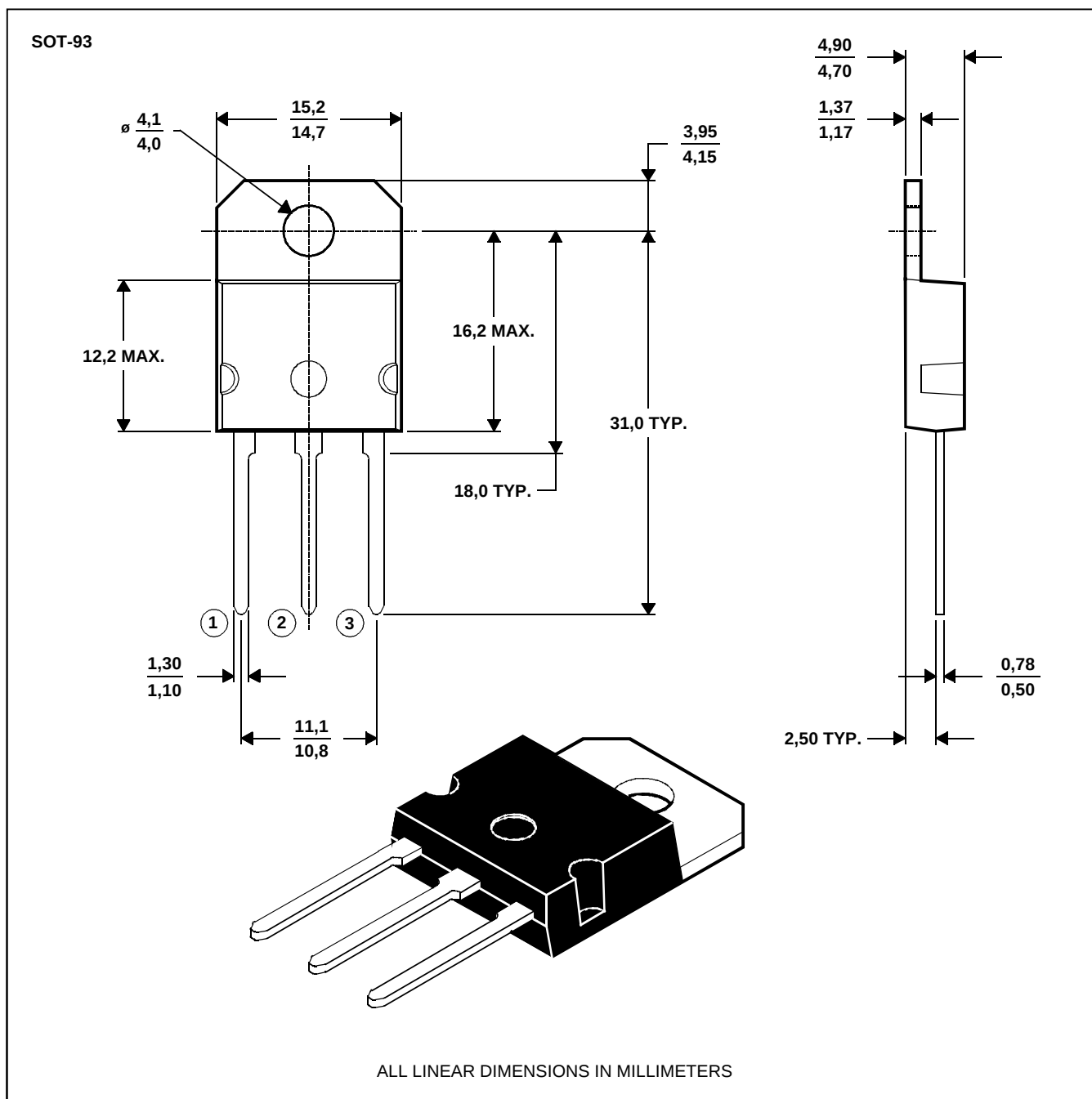
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MECHANICAL DATA

SOT-93

3-pin plastic flange-mount package

This single-in-line package consists of a circuit mounted on a lead frame and encapsulated within a plastic compound. The compound will withstand soldering temperature with no deformation, and circuit performance characteristics will remain stable when operated in high humidity conditions. Leads require no additional cleaning or processing when used in soldered assembly.



NOTE A: The centre pin is in electrical contact with the mounting tab.

MDXXAW

PRODUCT INFORMATION

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