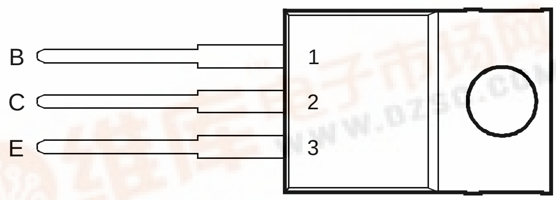
TIPL760, TIPL760A
NPN SILICON POWER TRANSISTORS

AUGUST 1978 - REVISED MARCH 1997

- **Rugged Triple-Diffused Planar Construction**
- **4 A Continuous Collector Current**
- **Operating Characteristics Fully Guaranteed at 100°C**
- **1000 Volt Blocking Capability**
- **75 W at 25°C Case Temperature**

TO-220 PACKAGE (TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage (I_E = 0)	TIPL760	V_{CBO}	850	V
	TIPL760A		1000	
Collector-emitter voltage (V_{BE} = 0)	TIPL760	V_{CES}	850	V
	TIPL760A		1000	
Collector-emitter voltage (I_B = 0)	TIPL760	V_{CEO}	400	V
	TIPL760A		450	
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}	75	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 ≤ 2%.

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

PARAMETER		TEST CONDITIONS				MIN	TYP	MAX	UNIT
$V_{CEO(sus)}$	Collector-emitter sustaining voltage	I_C = 10 mA	L = 25 mH	(see Note 2)	TIPL760 TIPL760A	400 450			V
I_{CES}	Collector-emitter cut-off current	V_{CE} = 850 V V_{CE} = 1000 V V_{CE} = 850 V V_{CE} = 1000 V	V_{BE} = 0 V_{BE} = 0 V_{BE} = 0 V_{BE} = 0	 T_C = 100°C T_C = 100°C	TIPL760 TIPL760A TIPL760 TIPL760A			50 50 200 200	µA
I_{CEO}	Collector cut-off current	V_{CE} = 400 V V_{CE} = 450 V	I_B = 0 I_B = 0		TIPL760 TIPL760A			50 50	µA
I_{EBO}	Emitter cut-off current	V_{EB} = 10 V	I_C = 0					1	mA
h_{FE}	Forward current transfer ratio	V_{CE} = 5 V	I_C = 0.5 A	(see Notes 3 and 4)		20		60	
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = 0.5 A I_B = 0.8 A I_B = 0.8 A	I_C = 2.5 A I_C = 4 A I_C = 4 A	 (see Notes 3 and 4) T_C = 100°C				1.0 2.5 5.0	V
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = 0.5 A I_B = 0.8 A I_B = 0.8 A	I_C = 2.5 A I_C = 4 A I_C = 4 A	 (see Notes 3 and 4) T_C = 100°C				1.2 1.4 1.3	V
f_t	Current gain bandwidth product	V_{CE} = 10 V	I_C = 0.5 A	f = 1 MHz			12		MHz
C_{ob}	Output capacitance	V_{CB} = 20 V	I_E = 0	f = 0.1 MHz			110		pF

NOTES: 2. Inductive loop switching measurement.
3. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 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			1.56	°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 = 4 A $V_{BE(off)}$ = -5 V	$I_{B(on)}$ = 0.8 A	(see Figures 1 and 2)			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 = 4 A $V_{BE(off)}$ = -5 V	$I_{B(on)}$ = 0.8 A T_C = 100°C	(see Figures 1 and 2)			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.

PARAMETER MEASUREMENT INFORMATION

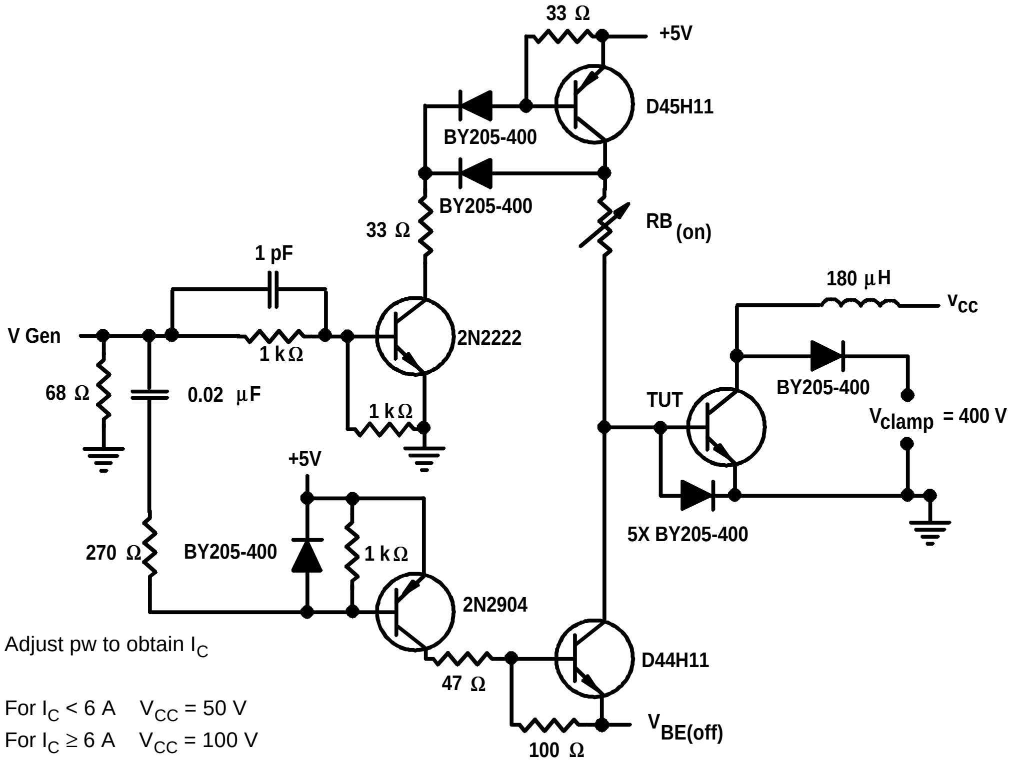
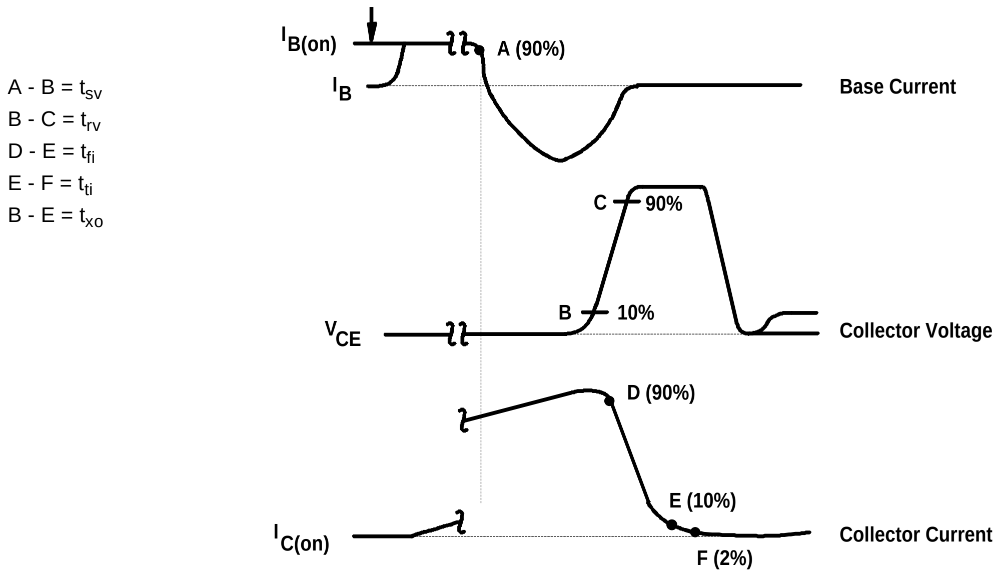


Figure 1. Inductive-Load Switching Test Circuit



NOTES: A. Waveforms are monitored on an oscilloscope with the following characteristics: $t_r < 15$ ns, $R_{in} > 10\ \Omega$, $C_{in} < 11.5$ pF.
B. Resistors must be noninductive types.

Figure 2. Inductive-Load Switching Waveforms

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

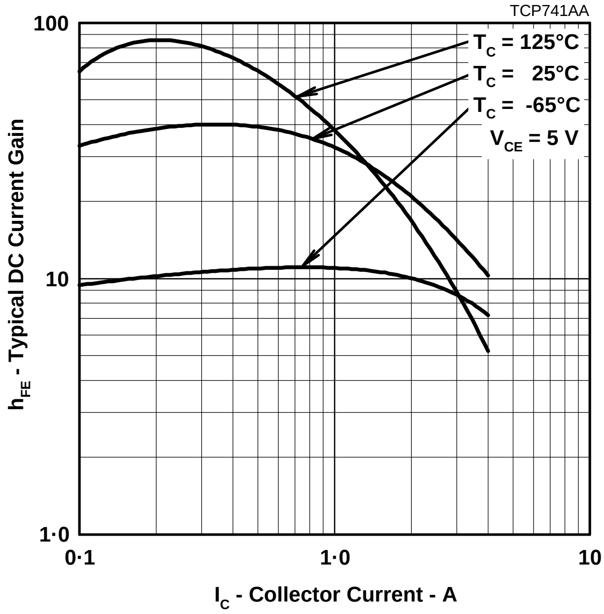


Figure 3.

COLLECTOR-EMITTER SATURATION VOLTAGE vs BASE CURRENT

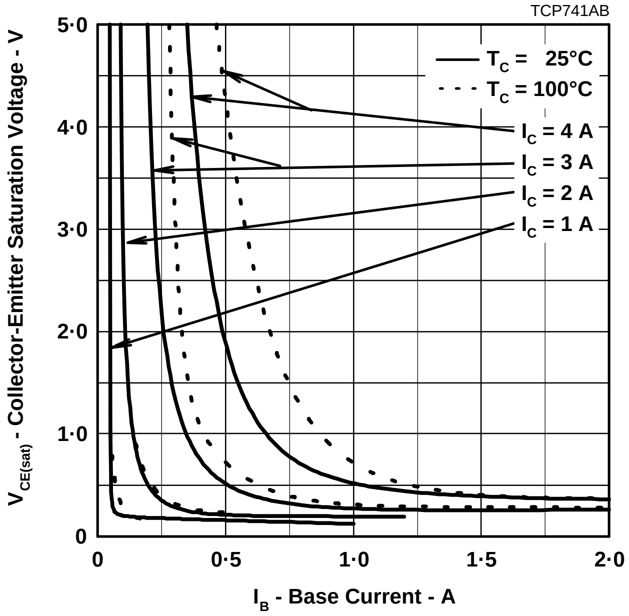


Figure 4.

BASE-EMITTER SATURATION VOLTAGE vs BASE CURRENT

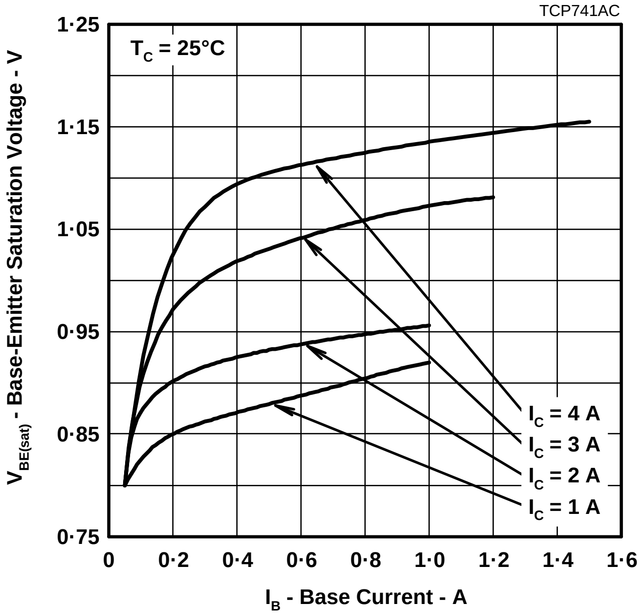


Figure 5.

COLLECTOR CUT-OFF CURRENT vs CASE TEMPERATURE

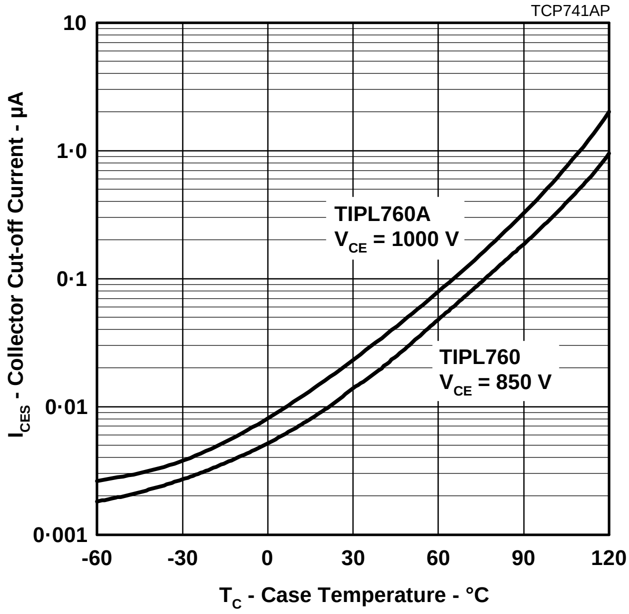


Figure 6.

MAXIMUM SAFE OPERATING REGIONS

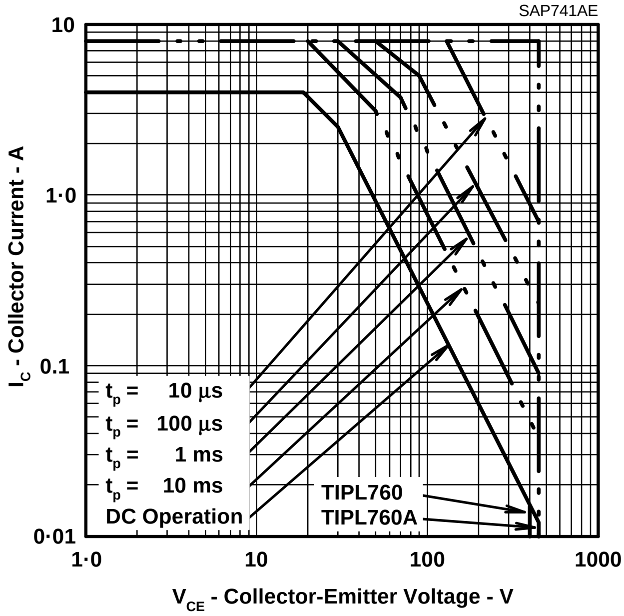


Figure 7.

THERMAL INFORMATION

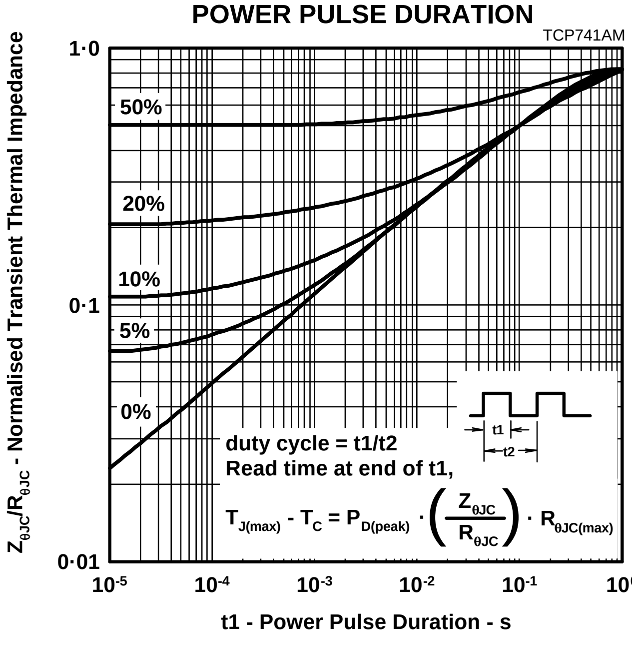


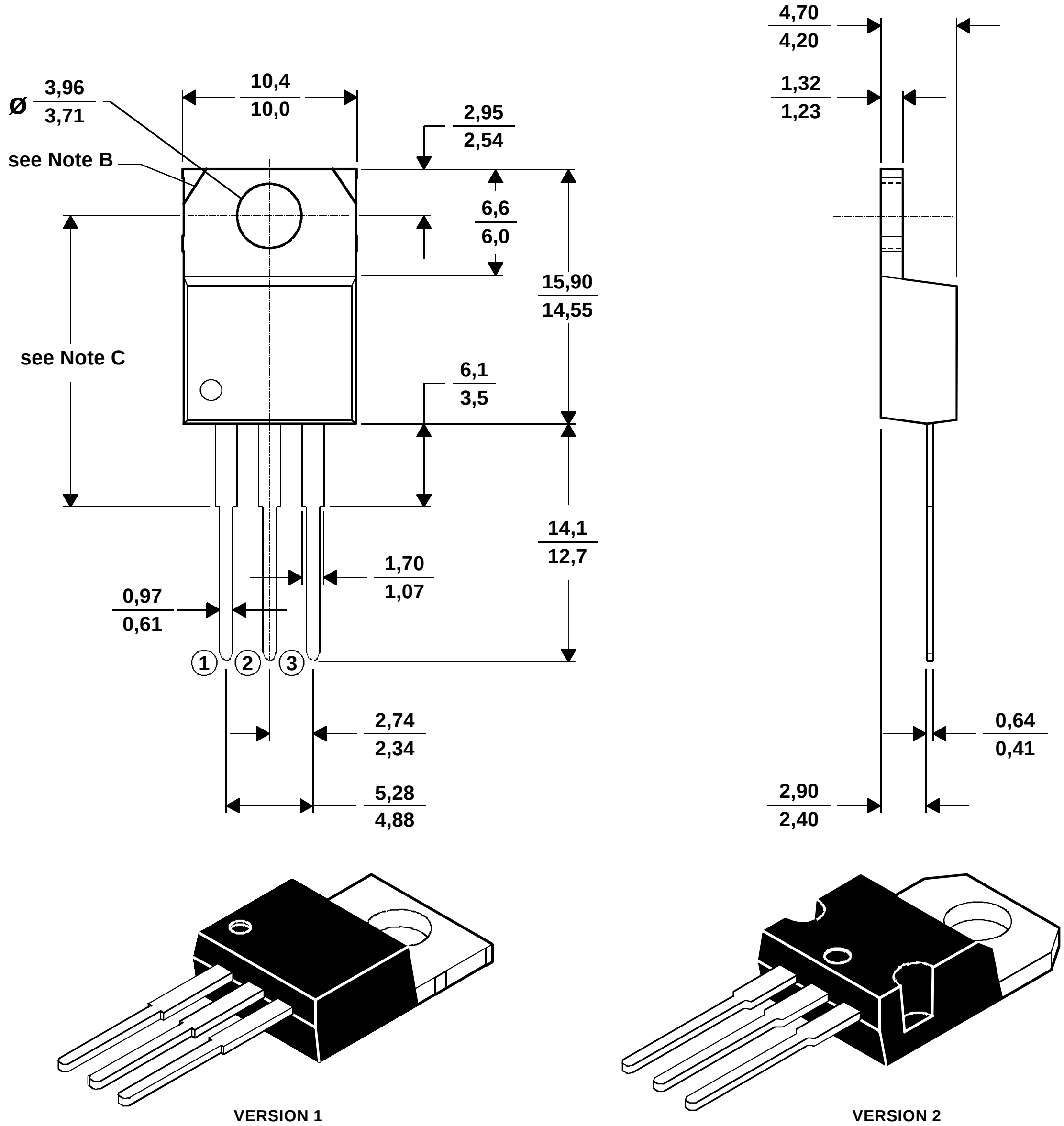
Figure 8.

MECHANICAL DATA

TO-220
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.

TO220



ALL LINEAR DIMENSIONS IN MILLIMETERS

NOTES: A. The centre pin is in electrical contact with the mounting tab.
B. Mounting tab corner profile according to package version.
C. Typical fixing hole centre stand off height according to package version.
Version 1, 18.0 mm. Version 2, 17.6 mm.

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