

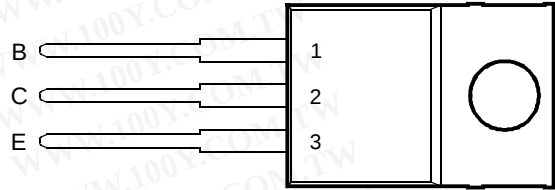
TIPL760, TIPL760A NPN SILICON POWER TRANSISTORS

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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.

MDTRACA

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 $\leq 2\%$.

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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.



TIPL760, TIPL760A

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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) TIPL760 TIPL760A	400 450			V
I_{CES} Collector-emitter cut-off current	$V_{CE} = 850\text{ V}$ $V_{BE} = 0$ TIPL760 $V_{CE} = 1000\text{ V}$ $V_{BE} = 0$ TIPL760A $V_{CE} = 850\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL760 $V_{CE} = 1000\text{ V}$ $V_{BE} = 0$ $T_C = 100^\circ\text{C}$ TIPL760A			50 50 200 200	μA
I_{CEO} Collector cut-off current	$V_{CE} = 400\text{ V}$ $I_B = 0$ TIPL760 $V_{CE} = 450\text{ V}$ $I_B = 0$ TIPL760A			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	$I_B = 0.5\text{ A}$ $I_C = 2.5\text{ A}$ $I_B = 0.8\text{ A}$ $I_C = 4\text{ A}$ (see Notes 3 and 4) $I_B = 0.8\text{ A}$ $I_C = 4\text{ A}$ $T_C = 100^\circ\text{C}$			1.0 2.5 5.0	V
$V_{BE(sat)}$ Base-emitter saturation voltage	$I_B = 0.5\text{ A}$ $I_C = 2.5\text{ A}$ $I_B = 0.8\text{ A}$ $I_C = 4\text{ A}$ (see Notes 3 and 4) $I_B = 0.8\text{ A}$ $I_C = 4\text{ A}$ $T_C = 100^\circ\text{C}$			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			1.56	$^\circ\text{C/W}$

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

PARAMETER	TEST CONDITIONS [†]	MIN	TYP	MAX	UNIT
t_{SV} Voltage storage time	$I_C = 4\text{ A}$ $I_{B(on)} = 0.8\text{ A}$ (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	$I_C = 4\text{ A}$ $I_{B(on)} = 0.8\text{ A}$ (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.

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PARAMETER MEASUREMENT INFORMATION

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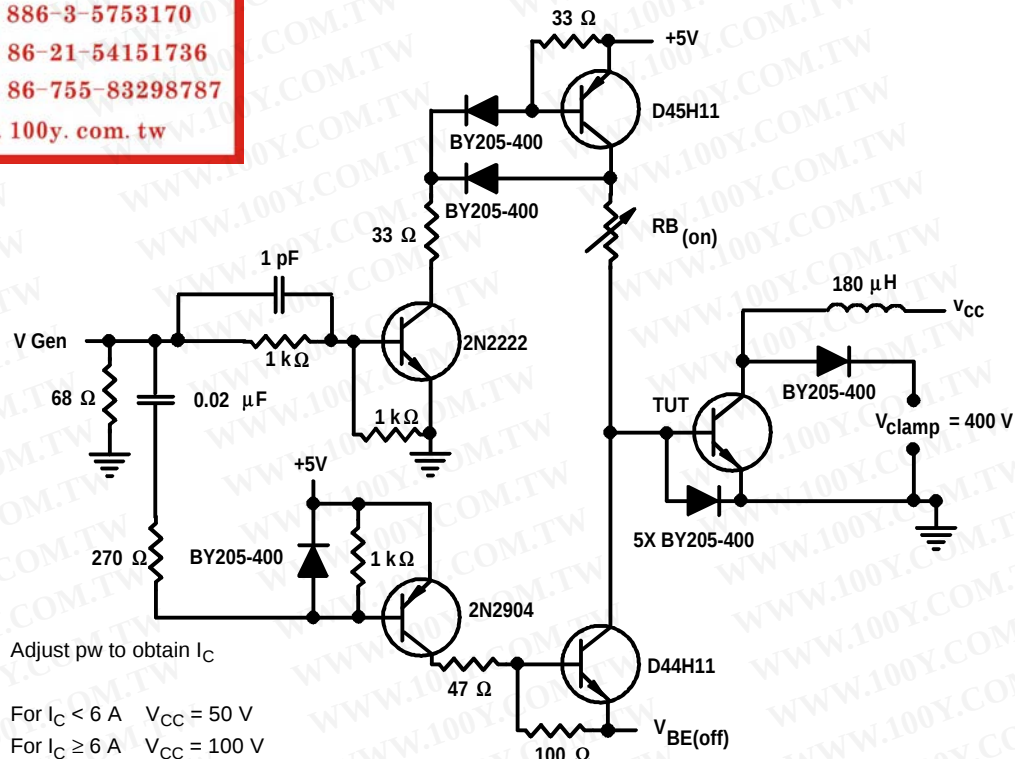
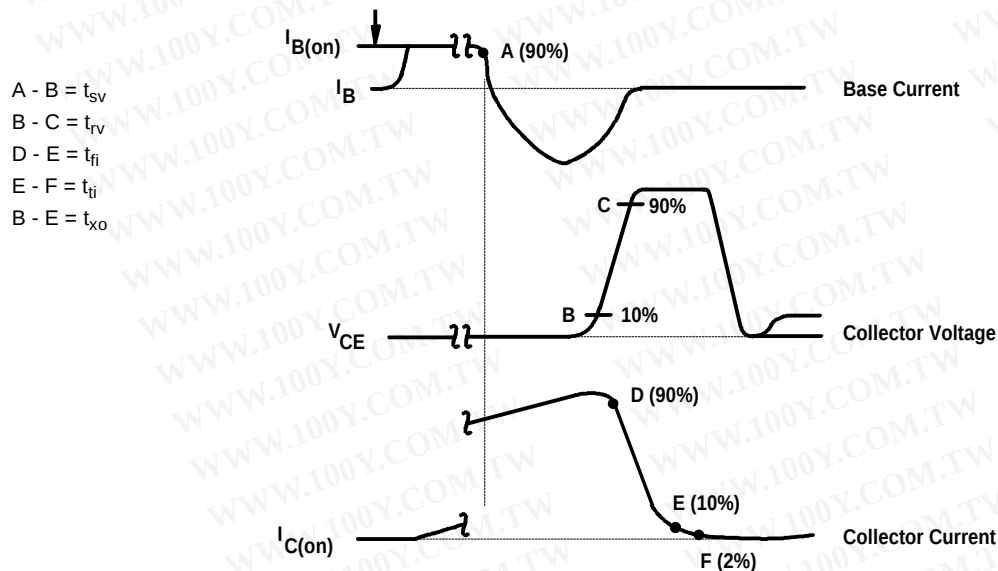


Figure 1. Inductive-Load Switching Test Circuit



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

Figure 2. Inductive-Load Switching Waveforms

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TYPICAL CHARACTERISTICS

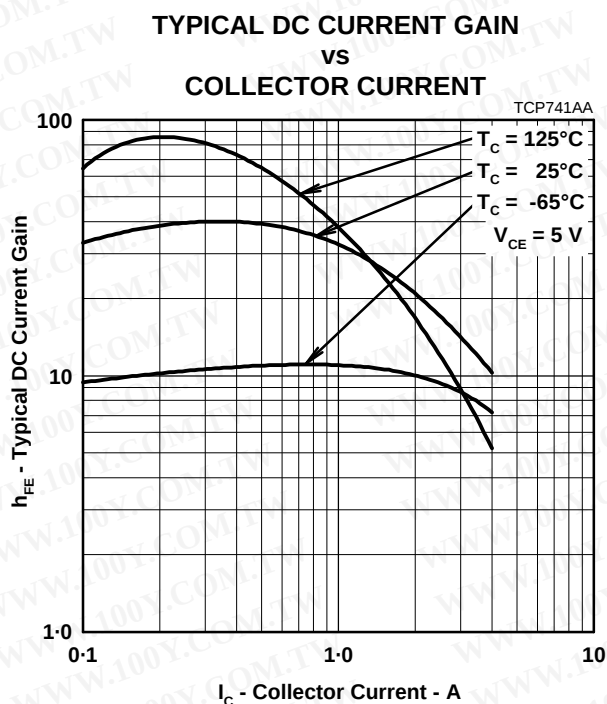


Figure 3.

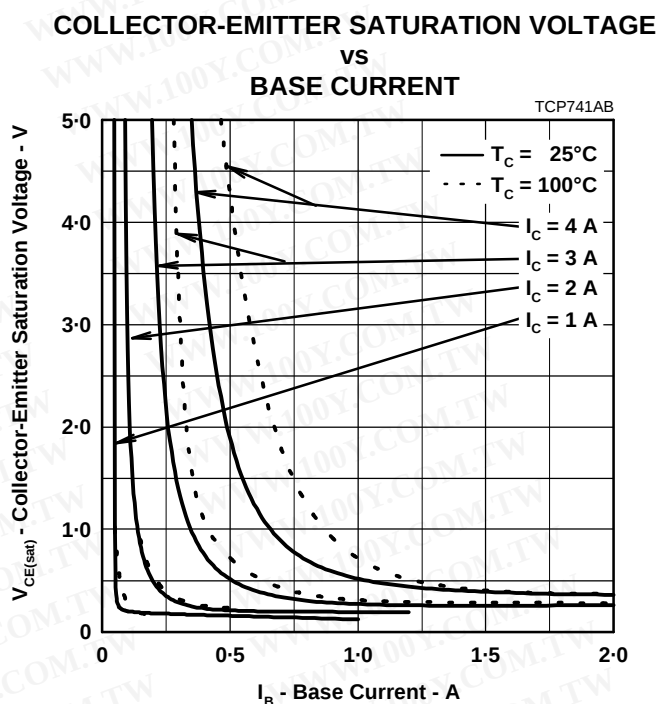


Figure 4.

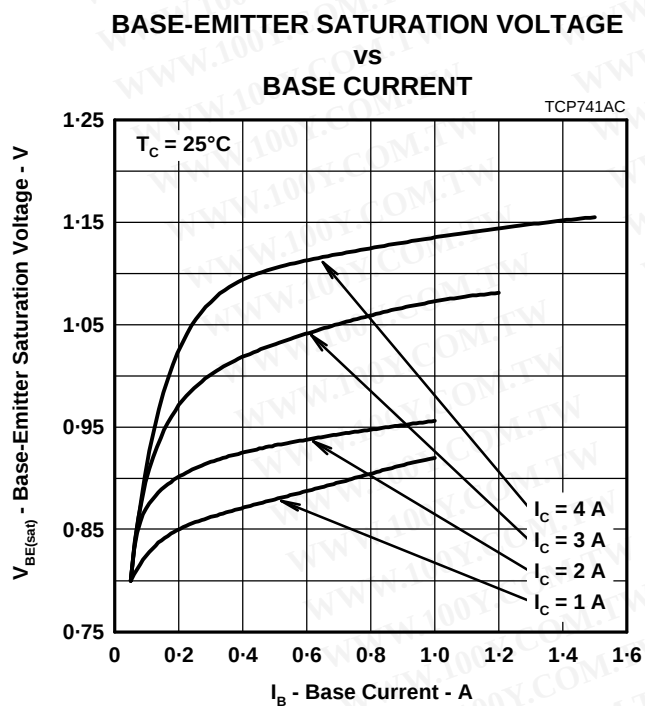


Figure 5.

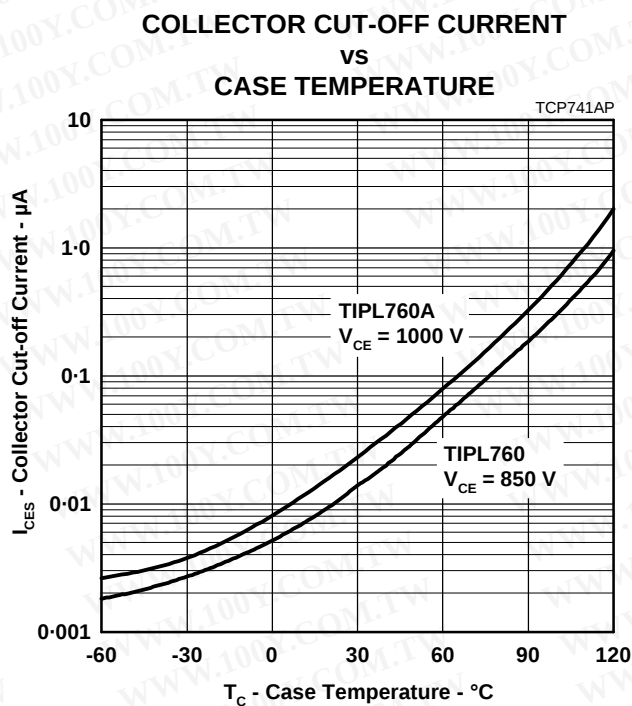
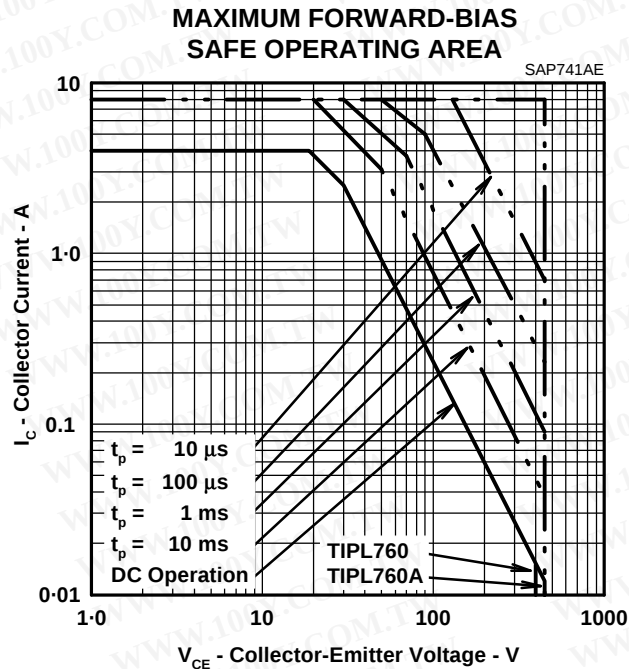


Figure 6.

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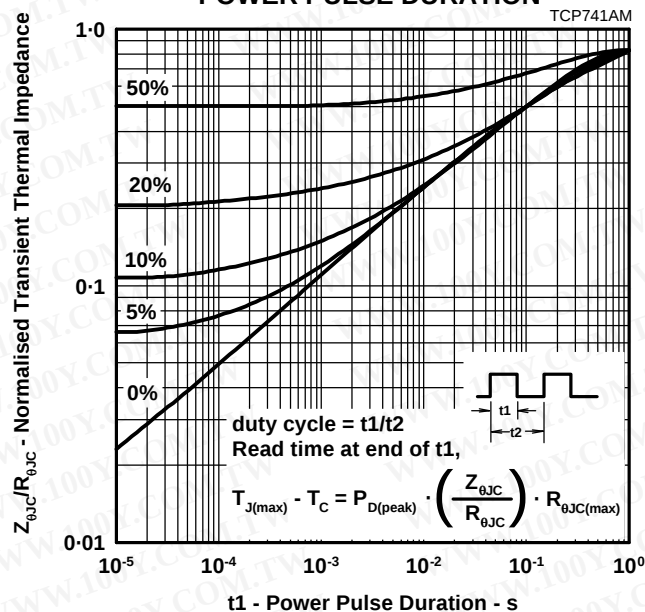
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MAXIMUM SAFE OPERATING REGIONS



THERMAL INFORMATION

THERMAL RESPONSE JUNCTION TO CASE VS POWER PULSE DURATION



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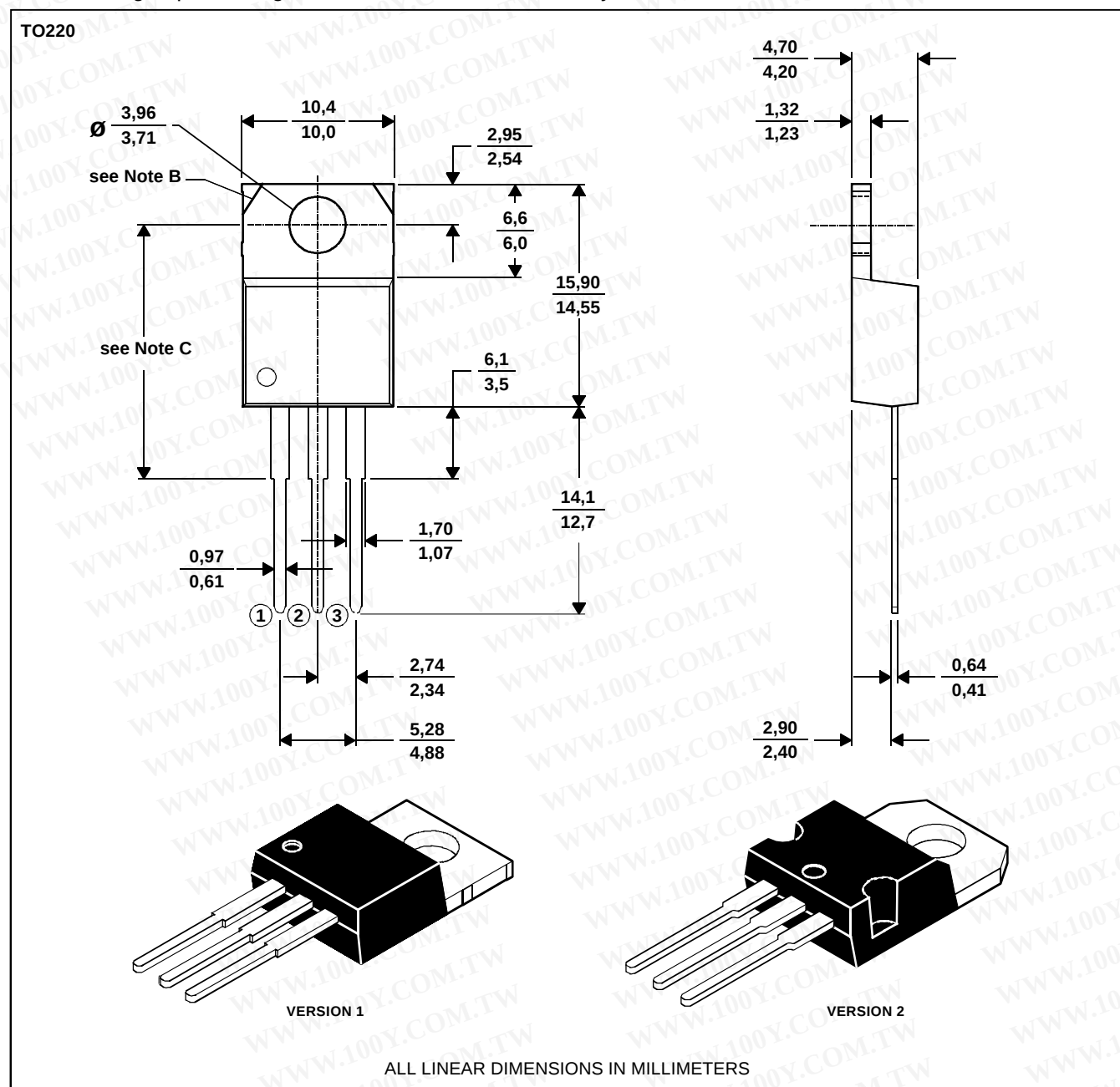
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MECHANICAL DATA

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.



- 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.

MDXXBE

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