



TUL1102

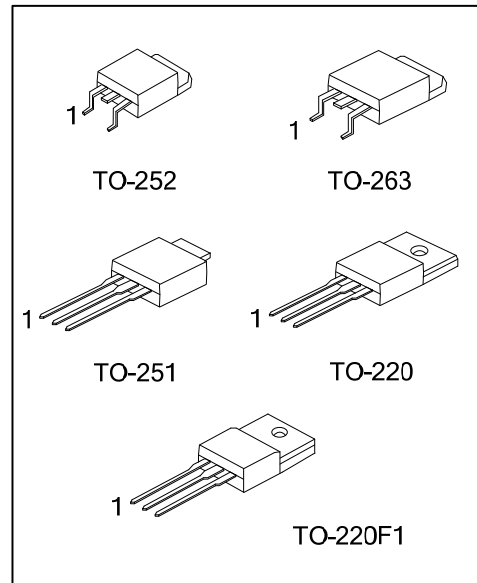
NPN SILICON TRANSISTOR

**HIGH VOLTAGE
FAST-SWITCHING NPN
POWER TRANSISTOR**

■ **DESCRIPTION**

The **TUL1102** is manufactured which is using high voltage Multi Epitaxial Planar technology for high voltage capability and high switching speeds. For enhancing switching speeds while maintaining a wide RBSOA, the **TUL1102** uses a Cellular Emitter structure with planar edge termination.

Because of an increased intermediate layer which has an intrinsic ruggedness, and it enables the transistor to withstand a high collector current level during Breakdown condition, without using the transil protection.



■ **FEATURES**

- * High voltage
- * Dynamic parameters: low spread
- * For reliable operation: minimum lot-to-lot spread
- * High switching speed

■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free Plating	Halogen-Free		1	2	3	
TUL1102L-TA3-T	TUL1102G-TA3-T	TO-220	B	C	E	Tube
TUL1102L-TF1-T	TUL1102G-TF1-T	TO-220F1	B	C	E	Tube
TUL1102L-TM3-T	TUL1102G-TM3-T	TO-251	B	C	E	Tube
TUL1102L-TN3-R	TUL1102G-TN3-R	TO-252	B	C	E	Tape Reel
TUL1102L-TQ2-T	TUL1102G-TQ2-T	TO-263	B	C	E	Tube
TUL1102L-TQ2-R	TUL1102G-TQ2-R	TO-263	B	C	E	Tape Reel

<p>TUL1102L-TA3-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TM3: TO-251 TN3: TO-252, TQ2: TO-263 (3) L: Lead Free, G: Halogen Free</p>
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■ **MARKING INFORMATION**

PACKAGE	MARKING
TO-220 TO-220F1 TO-251 TO-252 TO-263	<p>UTC TUL1102 Lot Code ← Data Code → L: Lead Free G: Halogen Free 1</p>

■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage ($V_{BE} = 0$)	V_{CES}	1100	V
Collector-Emitter Voltage ($I_B = 0$)	V_{CEO}	450	V
Emitter-Base Voltage ($I_C = 0$)	V_{EBO}	12	V
Collector Current	I_C	4	A
Collector Peak Current ($t_P < 5$ ms)	I_{CM}	8	A
Base Current	I_B	2	A
Base Peak Current ($t_P < 5$ ms)	I_{BM}	4	A
Power Dissipation ($T_C = 25^\circ\text{C}$)	TO-220/TO-263	70	W
	TO-220F1	30	
	TO-251/TO-252	45	
Junction Temperature	T_J	+150	$^\circ\text{C}$
Storage Temperature	T_{STG}	-65 ~ +150	$^\circ\text{C}$

Note: Absolute maximum ratings are the values beyond which the device will be damaged permanently.

Absolute maximum ratings are only stress ratings and it is not implied for functional device operation.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	TO-220/TO-263	1.78	$^\circ\text{C/W}$
	TO-220F1	4.2	
	TO-251/TO-252	2.78	

■ ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector Cut-off Current	I_{CES}	$V_{CE} = 1100$ V, $V_{BE} = 0$			100	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 12$ V, $I_B = 0$			1	mA
Collector-Emitter Sustaining Voltage	$V_{CEO(SUS)}$	$I_C = 100$ mA, $I_B = 0$ (Note)	450			V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C = 2$ A, $I_B = 400$ mA (Note)			1.5	V
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$	$I_C = 2$ A, $I_B = 400$ mA (Note)			1.5	V
DC Current Gain (Note)	h_{FE}	$I_C = 250$ mA, $V_{CE} = 5$ V	35		70	
		$I_C = 2$ A, $V_{CE} = 5$ V	12		20	
Resistive Load	Storage Time	$I_C = 2.5$ A, $I_{B1} = 0.5$ A, $I_{B2} = 1$ A $V_{CC} = 250$ V			2.5	μs
	Fall Time				300	ns
Avalanche Energy	E_{AR}	$L = 2$ mH, $C = 1.8$ nF $I_{BR} \leq 2.5$ A, $25^\circ\text{C} < T_C < 125^\circ\text{C}$	6			mJ

Note: Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %

■ TEST CIRCUIT

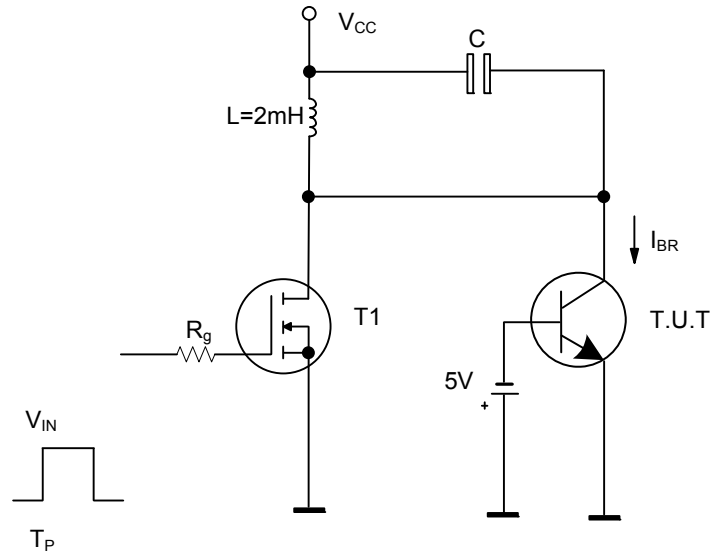


Fig.1 Energy Rating Test Circuit

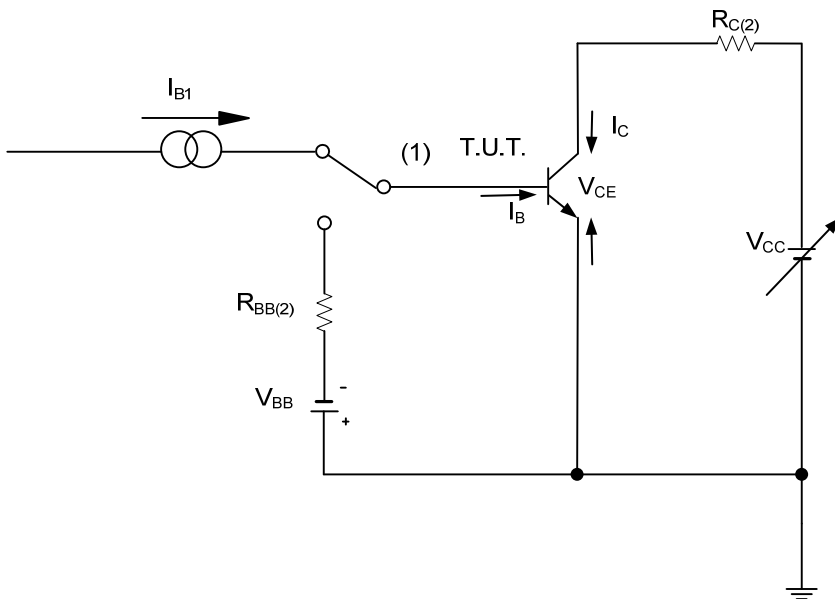
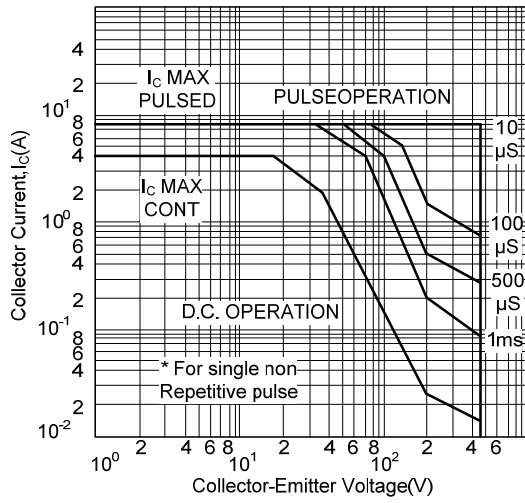


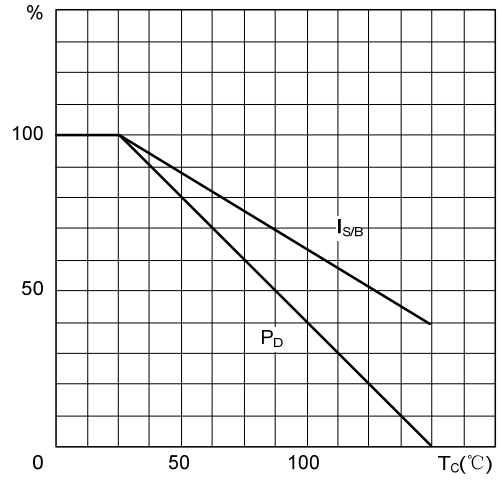
Fig.2 Resistive Load Switching Test Circuit

TYPICAL CHARACTERISTICS

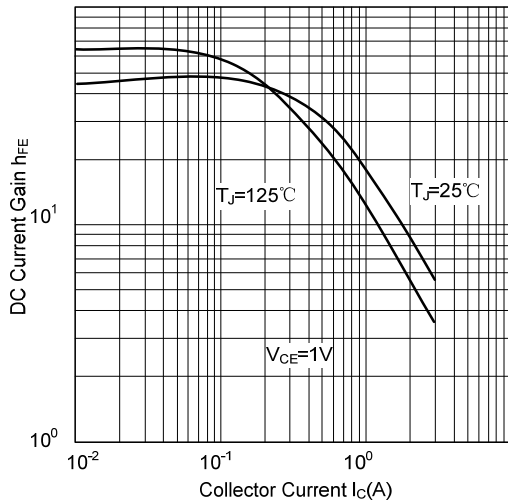
Safe Operating Areas



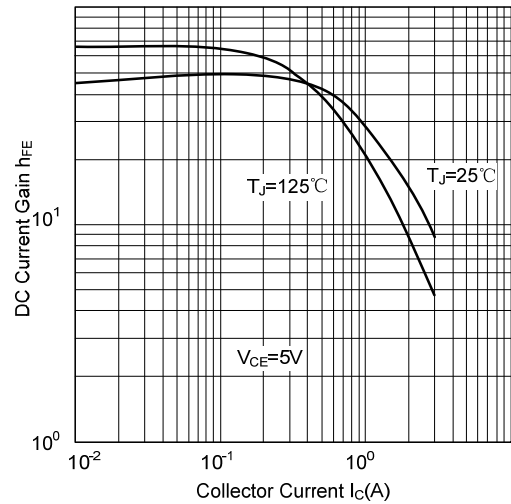
Derating Curve



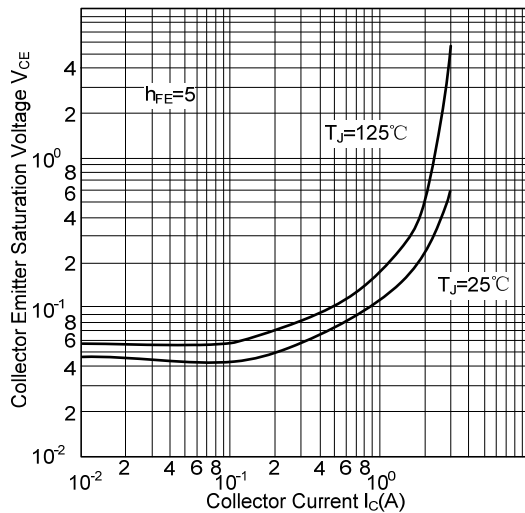
DC Current Gain



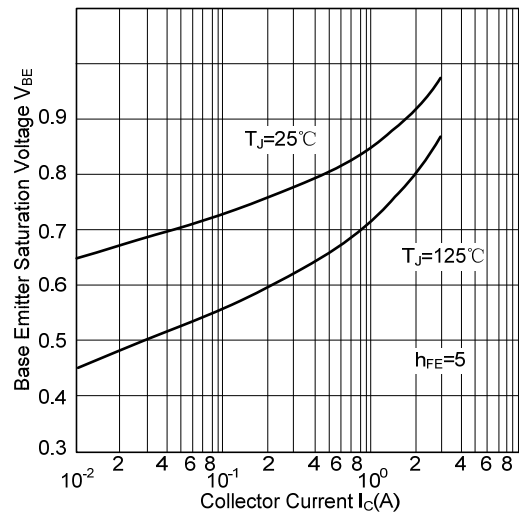
DC Current Gain



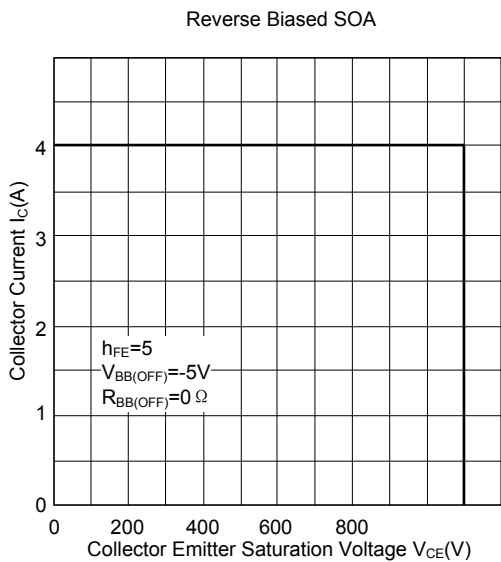
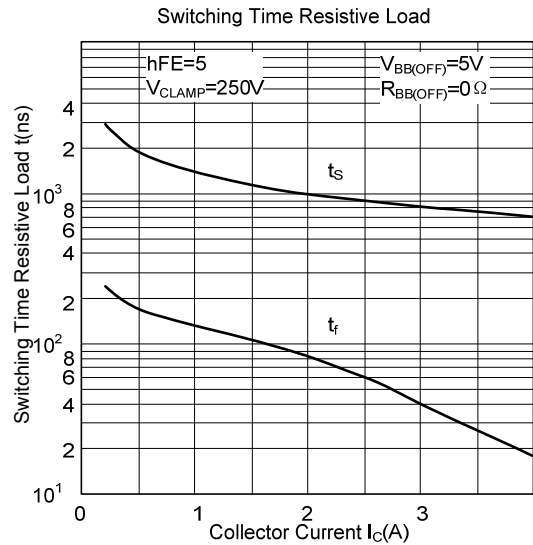
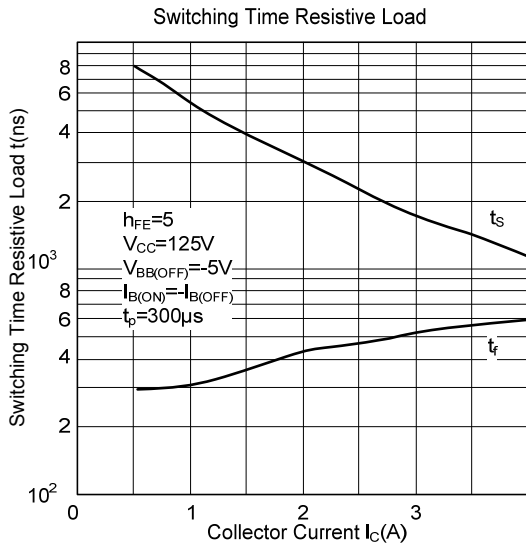
Collector Emitter Saturation Voltage



Base Emitter Saturation Voltage



■ TYPICAL CHARACTERISTICS(Cont.)



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