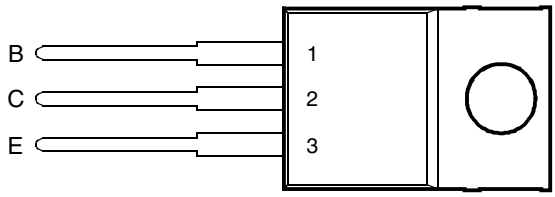
- **Designed for Complementary Use with BD645, BD647, BD649 and BD651**
- **62.5 W at 25°C Case Temperature**
- **8 A Continuous Collector Current**
- **Minimum h_{FE} of 750 at 3V, 3 A**

TO-220 PACKAGE
(TOP VIEW)



Pin 2 is in electrical contact with the mounting base.

MDTRACA

This series is obsolete and not recommended for new designs.

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

RATING		SYMBOL	VALUE	UNIT
Collector-base voltage (I_E = 0)	BD646	V_{CBO}	-80	V
	BD648		-100	
	BD650		-120	
	BD652		-140	
Collector-emitter voltage (I_B = 0)	BD646	V_{CEO}	-60	V
	BD648		-80	
	BD650		-100	
	BD652		-120	
Emitter-base voltage		V_{EBO}	-5	V
Continuous collector current		I_C	-8	A
Peak collector current (see Note 1)		I_{CM}	-12	A
Continuous base current		I_B	-0.3	A
Continuous device dissipation at (or below) 25°C case temperature (see Note 2)		P_{tot}	62.5	W
Continuous device dissipation at (or below) 25°C free air temperature (see Note 3)		P_{tot}	2	W
Unclamped inductive load energy (see Note 4)		$½LI_C^2$	50	mJ
Operating junction temperature range		T_j	-65 to +150	°C
Storage temperature range		T_{stg}	-65 to +150	°C
Lead temperature 3.2 mm from case for 10 seconds		T_L	260	°C

NOTES: 1. This value applies for $t_p \leq 0.3$ ms, duty cycle ≤ 10%.
2. Derate linearly to 150°C case temperature at the rate of 0.4 W/°C.
3. Derate linearly to 150°C free air temperature at the rate of 16 mW/°C.
4. This rating is based on the capability of the transistor to operate safely in a circuit of: L = 20 mH, $I_{B(on)}$ = -5 mA, R_{BE} = 100 Ω, $V_{BE(off)}$ = 0, R_S = 0.1 Ω, V_{CC} = -20 V.

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

PARAMETER		TEST CONDITIONS				MIN	TYP	MAX	UNIT
$V_{(BR)CEO}$	Collector-emitter breakdown voltage	I_C = -30 mA	I_B = 0	(see Note 5)	BD646	-60			V
					BD648	-80			
					BD650	-100			
					BD652	-120			
I_{CEO}	Collector-emitter cut-off current	V_{CE} = -30 V	I_B = 0		BD646			-0.5	mA
		V_{CE} = -40 V	I_B = 0		BD648			-0.5	
		V_{CE} = -50 V	I_B = 0		BD650			-0.5	
		V_{CE} = -60 V	I_B = 0		BD652			-0.5	
I_{CBO}	Collector cut-off current	V_{CB} = -60 V	I_E = 0		BD646			-0.2	mA
		V_{CB} = -80 V	I_E = 0		BD648			-0.2	
		V_{CB} = -100 V	I_E = 0		BD650			-0.2	
		V_{CB} = -120 V	I_E = 0		BD652			-0.2	
		V_{CB} = -40 V	I_E = 0	T_C = 150°C	BD646			-2.0	
		V_{CB} = -50 V	I_E = 0	T_C = 150°C	BD648			-2.0	
		V_{CB} = -60 V	I_E = 0	T_C = 150°C	BD650			-2.0	
		V_{CB} = -70 V	I_E = 0	T_C = 150°C	BD652			-2.0	
I_{EBO}	Emitter cut-off current	V_{EB} = -5 V	I_C = 0	(see Notes 5 and 6)				-5	mA
h_{FE}	Forward current transfer ratio	V_{CE} = -3 V	I_C = -3 A	(see Notes 5 and 6)		750			
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_B = -12 mA	I_C = -3 A	(see Notes 5 and 6)				-2	V
		I_B = -50 mA	I_C = -5 A					-2.5	
$V_{BE(sat)}$	Base-emitter saturation voltage	I_B = -50 mA	I_C = -5 A	(see Notes 5 and 6)				-3	V
$V_{BE(on)}$	Base-emitter voltage	V_{CE} = -3 V	I_C = -3 A	(see Notes 5 and 6)				-2.5	V

NOTES: 5. These parameters must be measured using pulse techniques, t_p = 300 µs, duty cycle ≤ 2%.
6. 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			2.0	°C/W
$R_{\theta JA}$	Junction to free air thermal resistance			62.5	°C/W

TYPICAL CHARACTERISTICS

TYPICAL DC CURRENT GAIN vs COLLECTOR CURRENT

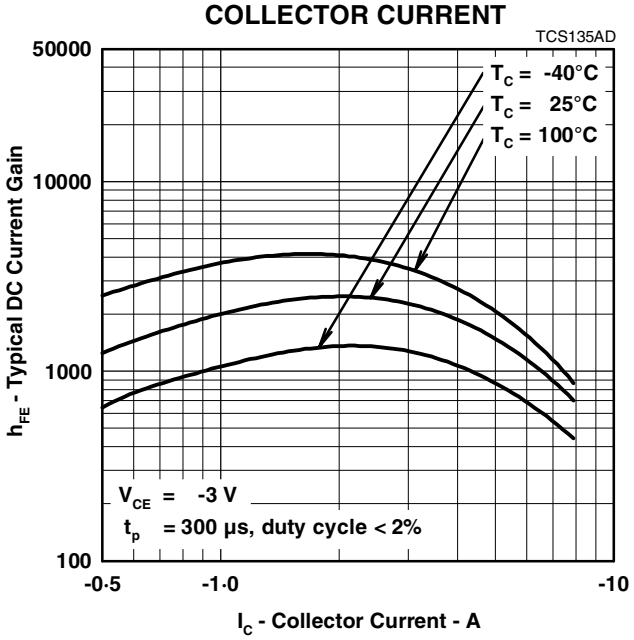


Figure 1.

COLLECTOR-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

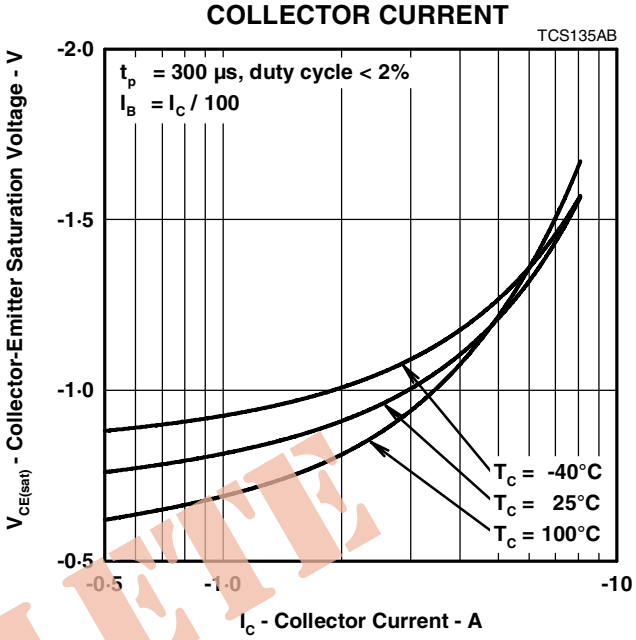


Figure 2.

BASE-EMITTER SATURATION VOLTAGE vs COLLECTOR CURRENT

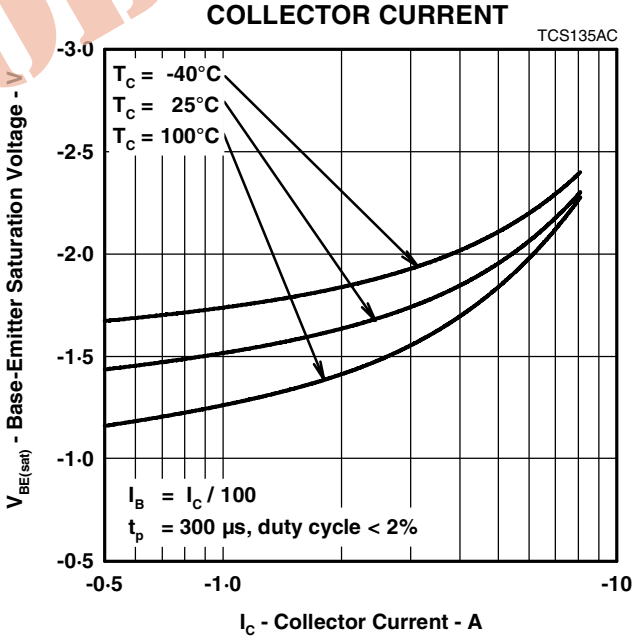


Figure 3.

MAXIMUM SAFE OPERATING REGIONS

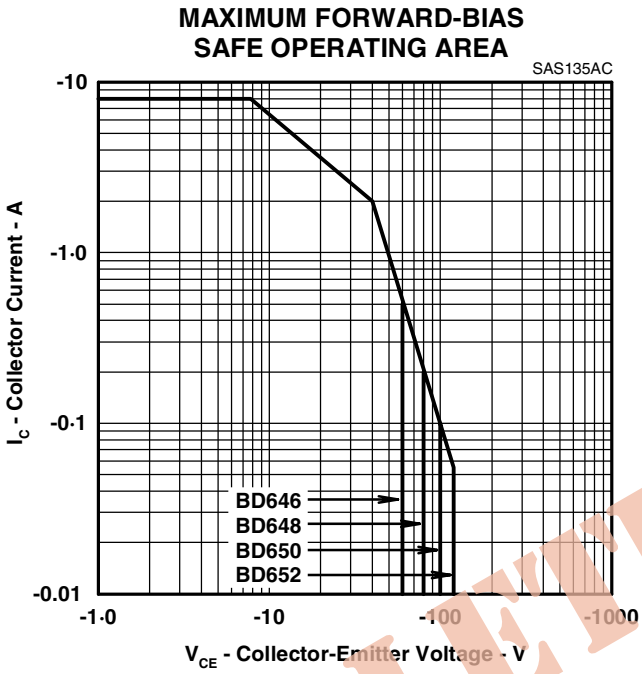


Figure 4.

THERMAL INFORMATION

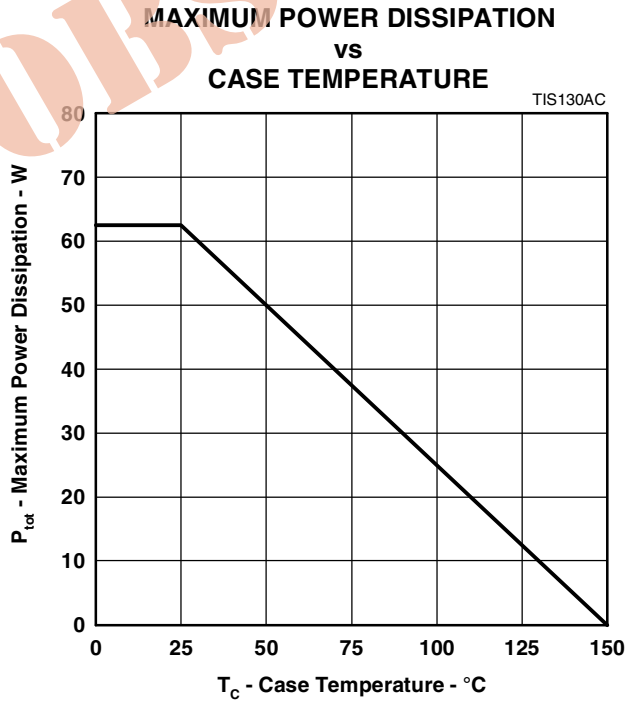


Figure 5.