

TYPES 2N1038, 2N1039, 2N1040, 2N1041

P-N-P ALLOY-JUNCTION GERMANIUM MEDIUM-POWER TRANSISTORS



40, 60, 80, 100 VOLT UNITS

1.25 Watts at 25°C Ambient

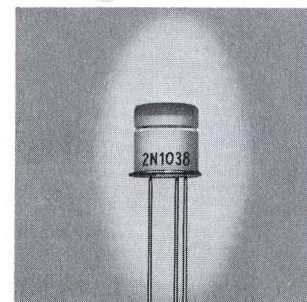
Guaranteed Beta at 50 ma and 1 amp

Low R_{CS} • Low I_{CO} • Low V_{BE}

ROUND WELDED PACKAGE

RELAY DRIVERS • PULSE AMPLIFIERS • AUDIO AMPLIFIERS

HIGH CURRENT SWITCHING CIRCUITS



ACTUAL SIZE

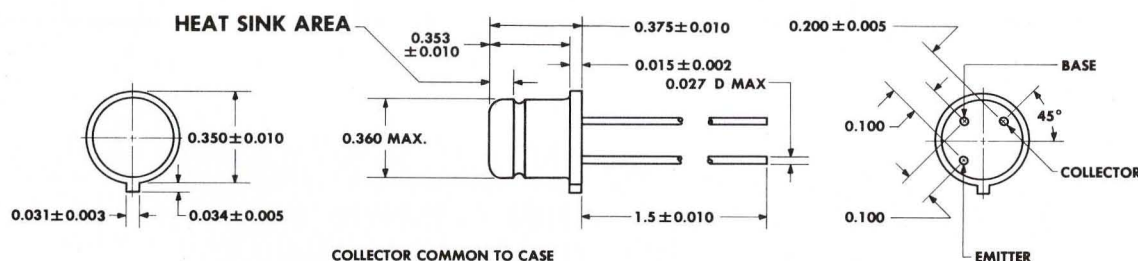
TYPES 2N1038 THROUGH 2N1041
BULLETIN NO. DL-S 1065, APRIL, 1959
REPLACES BULLETIN NO. DL-S 974, AUGUST, 1958

qualification testing

To assure maximum reliability, stability, and long life, all units are leak tested and heat cycled from -55°C to 95°C for four complete cycles over an eight-hour period. All transistors are tested for rigid adherence to specified design characteristics.

mechanical data

The transistor is encapsulated with glass-to-metal seals and a projection welded case. Any effective heat radiator can be clamped to the heat sink area, indicated in the outline drawing, due to the low thermal resistance from the collector junction to case. The approximate weight of the unit is 1.9 grams.



maximum ratings at 25°C*

	2N1038	2N1039	2N1040	2N1041	Units	
V_{CBO}	Collector-to-Base Voltage ($I_C = -750 \mu\text{a}$) ($I_E = 0$)	-40	-60	-80	-100	v
V_{CEX}	Collector-to-Emitter Voltage ($V_{BE} = +0.2 \text{ v}$, $I_C = -750 \mu\text{a}$)	-40	-60	-80	-100	v
V_{EBO}	Emitter-to-Base Voltage ($I_E = -750 \mu\text{a}$) ($I_C = 0$)	-20	-20	-20	-20	v
	Total Dissipation at 25°C*	20	20	20	20	w
	Total Dissipation at 75°C*	5.7	5.7	5.7	5.7	w
I_C	Collector Current	-3	-3	-3	-3	a
I_B	Base Current	-1	-1	-1	-1	a
T_J	Junction Temperature	95	95	95	95	°C

typical characteristics at 25°C*

	2N1038	2N1039	2N1040	2N1041	Units	
BV_{CBO}	Collector-to-Base Breakdown Voltage ($I_C = -750 \mu\text{a}$, $I_E = 0$)	-55	-75	-95	-115	v
h_{FE}	Forward Current Transfer Ratio† ($I_C = -1 \text{ amp}$, $V_{CE} = -0.5 \text{ v}$)	35	35	35	35	
R_{CS}	Common-Emitter Saturation Resistance ($I_C = -1 \text{ amp}$, $I_B = -100 \text{ ma}$)	0.2	0.2	0.2	0.2	ohms

* Temperature measured on heat sink area. See derating curve for operation at higher temperatures.

† h_{FE} is maintained within 3:1 spread ($h_{FE} = 20$ to 60 at $I_C = 1 \text{ amp}$, $V_{CE} = -0.5 \text{ v}$).

LICENSED UNDER BELL SYSTEM PATENTS

SEMICONDUCTOR-COMPONENTS DIVISION

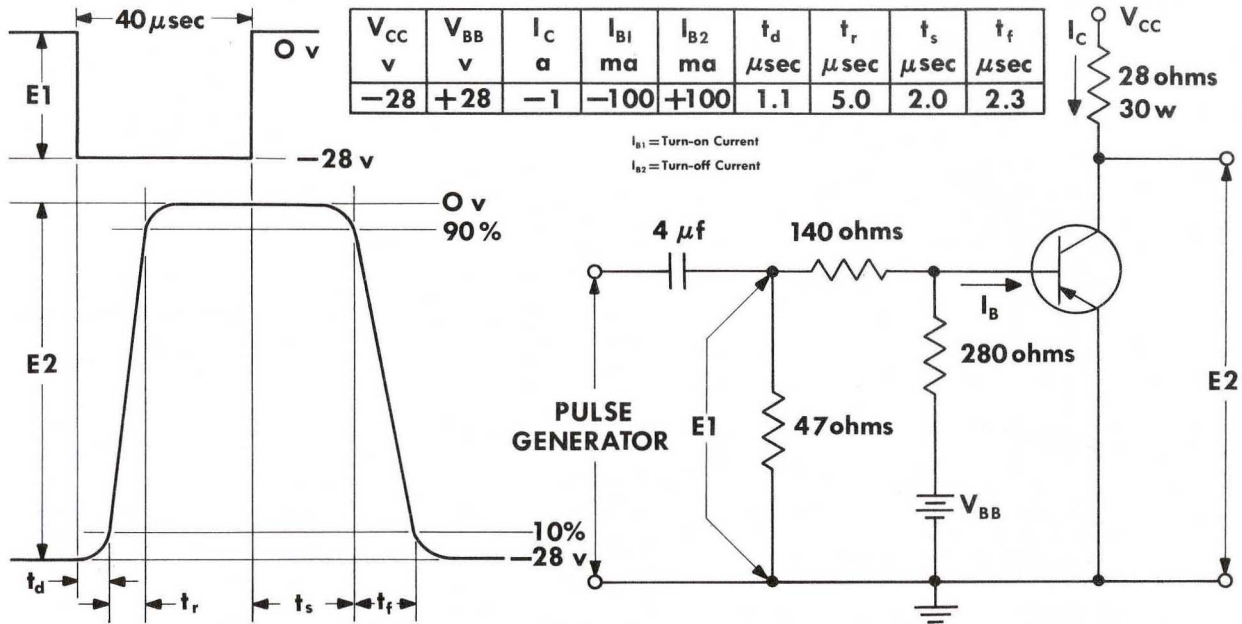
TEXAS INSTRUMENTS
INCORPORATED

SEMICONDUCTOR-COMPONENTS DIVISION
POST OFFICE BOX 312 • 13500 N. CENTRAL EXPRESSWAY
DALLAS, TEXAS

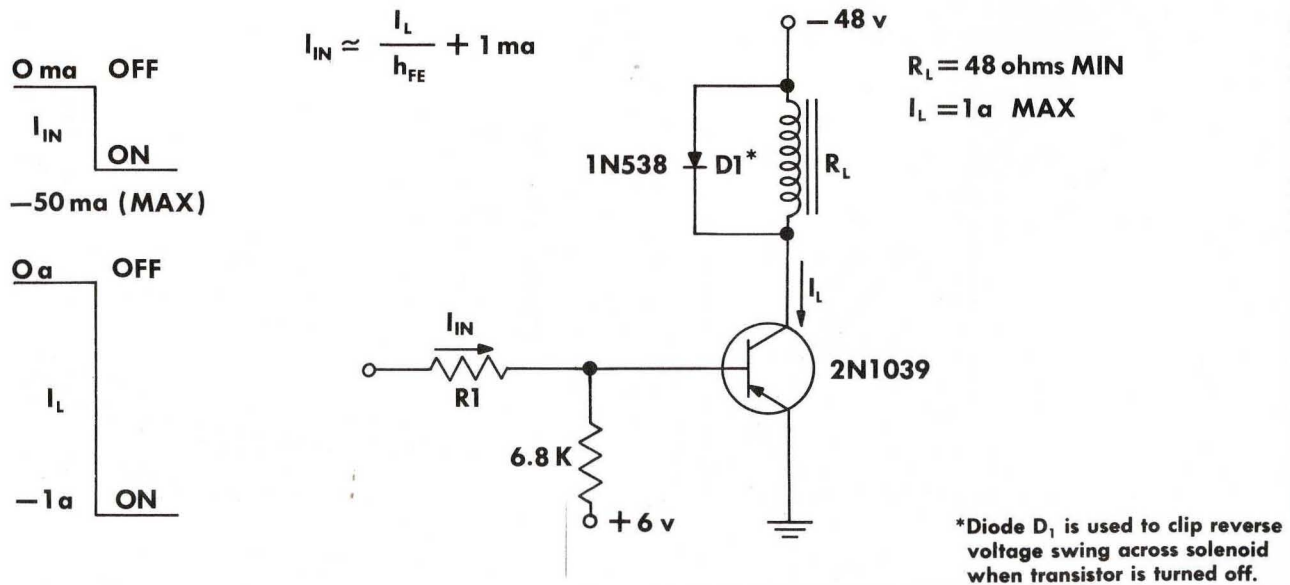
TYPES 2N1038, 2N1039, 2N1040, 2N1041

TYPICAL CHARACTERISTICS

TYPICAL SWITCHING CIRCUIT AT 25°C



TYPICAL SOLENOID RELAY DRIVER



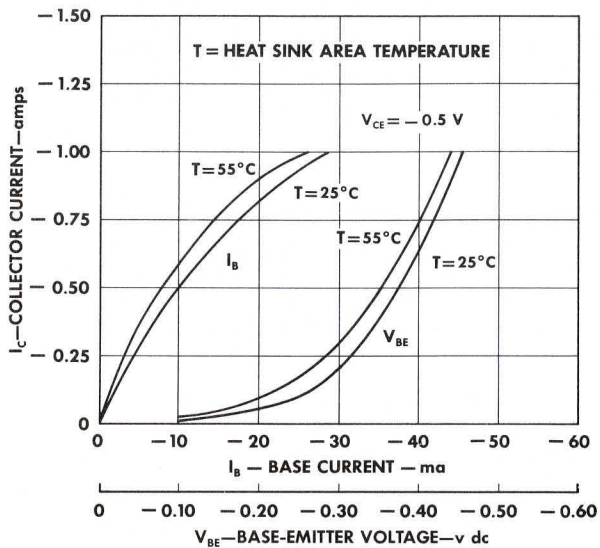
TEXAS INSTRUMENTS
INCORPORATED

SEMICONDUCTOR COMPONENTS DIVISION
POST OFFICE BOX 312 • 13500 N. CENTRAL EXPRESSWAY
DALLAS, TEXAS

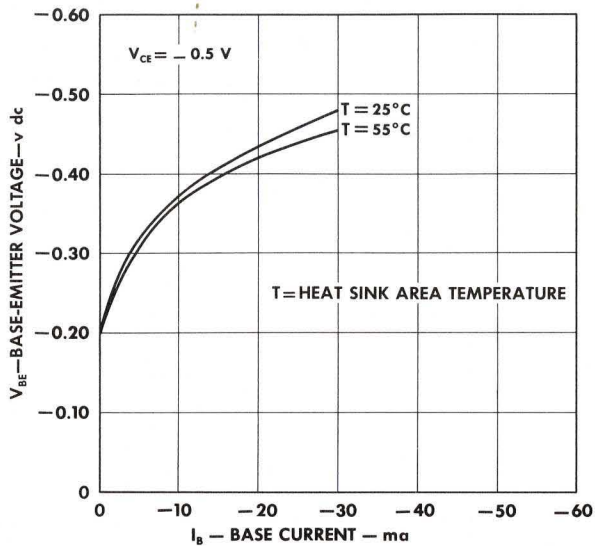
TO SUPPLY THE BEST PRODUCTS POSSIBLE, TEXAS INSTRUMENTS RESERVES THE RIGHT TO MAKE CHANGES AT ANY TIME IN ORDER TO IMPROVE DESIGN.

PRINTED IN U.S.A.

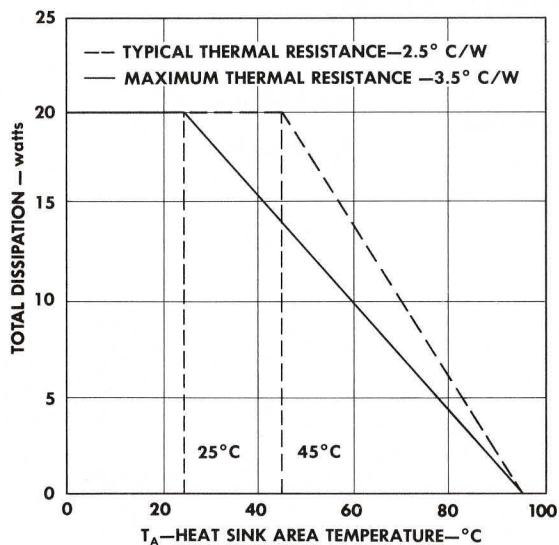
CURRENT TRANSFER AND TRANSCONDUCTANCE CHARACTERISTICS



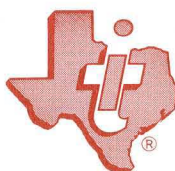
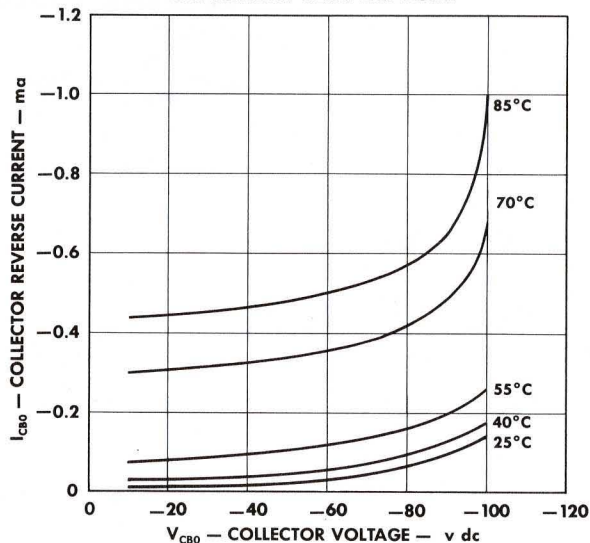
INPUT CHARACTERISTICS



DISSIPATION DERATING



COLLECTOR REVERSE CURRENT vs JUNCTION TEMPERATURE



TYPES 2N1038, 2N1039, 2N1040, 2N1041

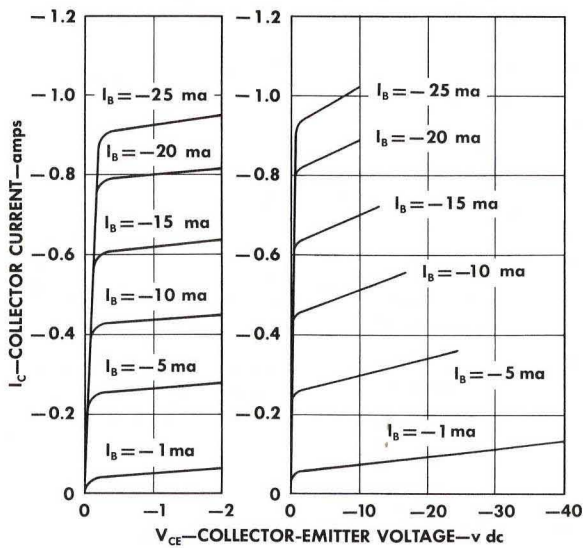
TYPICAL CHARACTERISTICS

design characteristics at 25°C

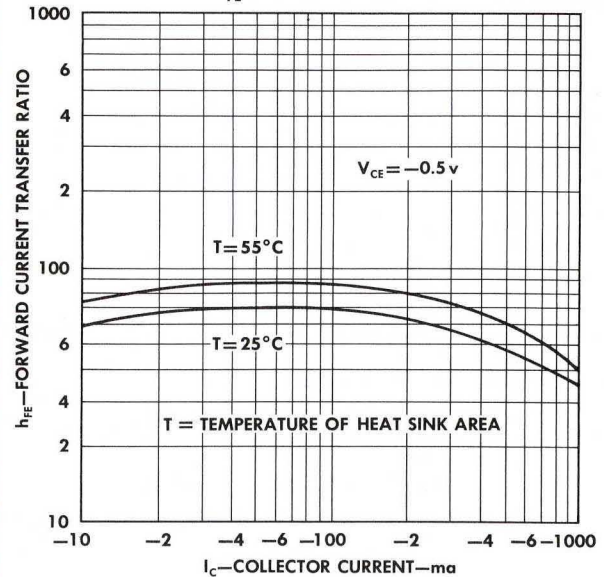
type	symbol	parameter	test conditions	min.	design center	max.	unit
2N1038	BV_{CB0}	Collector-to-Base Breakdown Voltage	$I_C = -750 \mu a, I_E = 0$	-40	—	—	v
2N1039	BV_{CB0}	Collector-to-Base Breakdown Voltage	$I_C = -750 \mu a, I_E = 0$	-60	—	—	v
2N1040	BV_{CB0}	Collector-to-Base Breakdown Voltage	$I_C = -750 \mu a, I_E = 0$	-80	—	—	v
2N1041	BV_{CB0}	Collector-to-Base Breakdown Voltage	$I_C = -750 \mu a, I_E = 0$	-100	—	—	v
All	BV_{EB0}	Emitter-to-Base Breakdown Voltage	$I_E = -750 \mu a, I_C = 0$	-20	—	—	v
All	I_{CB0}	Collector Reverse Current	$V_{CB} = \frac{1}{2} BV_{CB0} \text{ Min}, I_E = 0$	—	-50	-125	μa
All	I_{EB0}	Emitter Reverse Current	$V_{EB} = -10v, I_C = 0$	—	-50	—	μa
All	I_B	Base Current	$I_C = -1a, V_{CE} = -0.5v$	-16.7	-30	-50	ma
All	I_B	Base Current	$I_C = -50ma, V_{CE} = -0.5v$	-0.5	-0.75	-1.5	ma
All	V_{BE}	Base Voltage	$I_C = -1a, V_{CE} = -0.5v$	—	-0.45	-1.0	v
All	V_{BE}	Base Voltage	$I_C = -50ma, V_{CE} = -0.5v$	—	-0.2	-0.35	v
All	$V_{CE} \text{ (Sat.)}$	Saturation Voltage	$I_C = -1a, I_B = -100ma$	—	-0.2	-0.25	v
All	C_{ob}	Collector-to-Base Capacity	$V_{CB} = -6v, I_E = 0$	—	100	—	$\mu\mu f$
All	$f_{\alpha e}$	Common-Emitter Current Transfer Ratio Cutoff Frequency	$V_{CE} = -1.5v, I_C = -500 \text{ ma}$	—	8.5	—	kc

TYPICAL CHARACTERISTICS — COMMON EMITTER

OUTPUT CHARACTERISTICS



h_{FE} CHARACTERISTICS



TEXAS INSTRUMENTS
INCORPORATED

SEMICONDUCTOR COMPONENTS DIVISION
POST OFFICE BOX 312 • 13500 N. CENTRAL EXPRESSWAY
DALLAS, TEXAS