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2N1038, 2N1039*, 2N1040, 2N1041* **A**
2N2552, 2N2553*, 2N2554, 2N2555* **B**
2N2556, 2N2557*, 2N2558, 2N2559* **C**

PNP GERMANIUM ALLOY JUNCTION POWER TRANSISTORS

These hermetically sealed and dynamically tested units are designed to switch reactive and resistive loads at maximum efficiency by using a unique internal heat-sink design. Each unit can dissipate up to .4 watt in free air at 25°C and up to 1 watt in forced air at 25°C and can also be pressed into suitable heat-sink wells to dissipate up to 8 watts at 71°C. Typical applications include relay drivers, pulse amplifiers, audio amplifiers and high current switching circuits. The collector lead is internally connected to the case.

MAXIMUM DESIGN LIMITS

	2N1038 2N2552 2N2556	2N1039 2N2553 2N2557	2N1040 2N2554 2N2558	2N1041 2N2555 2N2559	Units
Collector-to-Base Voltage, V_{CB}	−40	−60	−80	−100	Volts
Collector-to-Emitter Voltage, V_{CE}					
Acting Region Emitter Forward Biased	−30	−40	−50	−60	Volts
Cutoff Region Emitter Reverse Biased	−40	−60	−80	−100	Volts
Emitter-to-Base Voltage, V_{EB}		−20			Volts
Collector Current, I_C		−3.0			Amp
Base Current, I_B		−1.0			Amp
Operating and Junction Temp. T_J		−55 to +100			°C
Thermal Resistance, Junction to Free Air Θ JA		185			°C/W
Thermal Resistance, Junction to Case Θ JC		3.67			°C/W

CHARACTERISTICS AT 25°C CASE TEMPERATURE

Parameter	Symbol	Condition	Min.	Max.	Units
Current Gain, Common Emitter	H_{FE1}	V_{CE} = −0.5V, I_C = −1 A	20	60	—
Current Gain, Common Emitter	H_{FE2}	V_{CE} = −0.5V, I_C = −50 mA	33	200	—
Base-to-Emitter Voltage	V_{BE1}	V_{CE} = −0.5V, I_C = −1.0 A		−1.0	Volts
	Y_{FE1}		1.0		mhos
Base-to-Emitter Voltage	V_{BE2}	V_{CE} = −0.5V, I_C = −50 mA		−0.35	Volts
	Y_{FE2}		0.143		mhos
Collector-Emitter Saturation Voltage*	V_{CE} (sat)	I_C = −1 A, I_B = −100 mA		0.25	Volts
Collector Junction Leakage Current	I_{CBO}				
2N1038, 2N2552, 2N2556		V_{CB} = −20V		−125	μAmp
2N1039, 2N2553, 2N2557		V_{CB} = −30V			
2N1040, 2N2554, 2N2558		V_{CB} = −40V			
2N1041, 2N2555, 2N2559		V_{CB} = −50V			
Collector-Base Breakdown Voltage	BV_{CBO}	I_C = −750			
2N1038, 2N2552, 2N2556			−40		Volts
2N1039, 2N2553, 2N2557			−60		
2N1040, 2N2554, 2N2558			−80		
2N1041, 2N2555, 2N2559			−100		
Collector Cutoff Current	I_{CEX}	V_{BE} = +0.2V			
2N1038, 2N2552, 2N2556		V_{CE} = −40V		−650	μAmp
2N1039, 2N2553, 2N2557		V_{CE} = −60V			
2N1040, 2N2554, 2N2558		V_{CE} = −80V			
2N1041, 2N2555, 2N2559		V_{CE} = −100V			

*Note: Measured adjacent to header to minimize lead effects.

CHARACTERISTICS AT 25°C CASE TEMPERATURE

Parameter	Symbol	Condition	Min.	Max.	Units
Collector Cutoff Current	I_{CEO}				
2N1038, 2N2552, 2N2556		$I_B=0$, $V_{CE}=-15V$		−25	mA
2N1039, 2N2553, 2N2557		$I_B=0$, $V_{CE}=-20V$		−20	
2N1040, 2N2554, 2N2558		$I_B=0$, $V_{CE}=-25V$		−20	
2N1041, 2N2555, 2N2559		$I_B=0$, $V_{CE}=-30V$		−20	
Collector Emitter Breakdown Voltage	V_{CEO} (sus)				
2N1038, 2N2552, 2N2556		$I_C=100$ mA	−30		Volts
2N1039, 2N2553, 2N2557			−40		
2N1040, 2N2554, 2N2558			−50		
2N1041, 2N2555, 2N2559			−60		
Emitter-Junction Leakage Current	I_{EBO}	$V_{EB}=-20V$		−650	μAmp
Emitter-Base Breakdown Voltage	BV_{EBO}	$I_E=750$ μAmps	20		Volts

CHARACTERISTICS AT 85°C CASE TEMPERATURE

Parameter	Symbol	Condition	Min.	Max.	Units
Collector Cutoff Current	I_{CEX}	$V_{BE}=+0.2V$			
2N1038, 2N2552, 2N2556		$V_{CE}=-20V$			
2N1039, 2N2553, 2N2557		$V_{CE}=-30V$		−5.0	mA
2N1040, 2N2554, 2N2558		$V_{CE}=-40V$			
2N1041, 2N2555, 2N2559		$V_{CE}=-50V$			

DYNAMIC CHACTERISTICS

Parameter	Condition	Min.	Max.	Units
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio, h_{fe}	$V_{CE}=-0.5V$, $I_C=0.5$ A f=112.5 kc	2	—	—
Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio, h_{fe}	$V_{CE}=-1.5V$, $I_C=-0.5$ A f=1 kc	18	72	—

Environmental Characteristics

In addition to meeting the degradation limits imposed by MIL-S-19500/89C, these units exhibit the following more rigid environmental requirements.

1. A typical decrease in H_{FE} of less than 10% at 100°C storage for 1000 hours ($I_C=-1$ amp and $V_{CE}=-½V$).
2. Typical H_{FE} @ 100C°C storage dips to a minimum gain level at 500 hours and stabilizes out to 1000 hours.
3. A typical increase in H_{FE} of less than 15% after 100°C operation for 1000 hours. ($I_C=-1$ amp and $V_{CE}=-½V$).
4. Typical H_{FE} at 100°C operation rises to a maximum level at 100 hours and stabilizes out to 1000 hours.
5. Typical I_{cbo} at 100°C operation stabilizes at an average reduction of 15% at 1000 hours. Most of this decrease occurs in the first 100 hours.**

**When devices are used in applications which require prolonged exposure at 100°C, optimum stability is obtained when maintained in an operating mode. ("on" or "off" condition).

MECHANICAL DATA