2N956

For Specifications, See 2N718A Data.

2N960 (GERMANIUM)
2N961
2N962

2N962JAN AVAILABLE
2N964
2N964JAN AVAILABLE
2N965
2N966

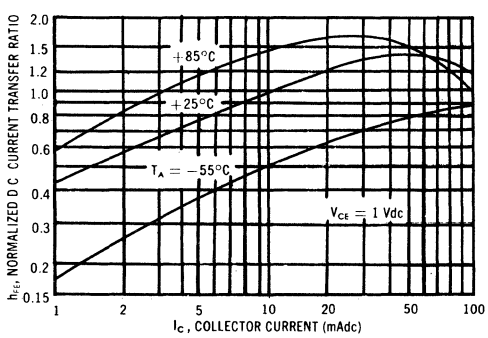
CASE 22
(TO-18)
Collector connected to case

PNP germanium epitaxial mesa transistors for high-speed switching applications.

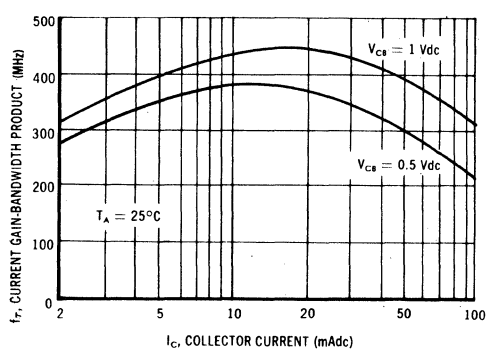
MAXIMUM RATINGS

Characteristic	Symbol	2N960 2N964	2N961 2N965	2N962 2N966	Unit
Collector-Emitter Voltage	V_{CE}	15	12	12	Vdc
Collector-Base Voltage	V_{CB}	15	12	12	Vdc
Emitter-Base Voltage	V_{EB}	2.5	2.0	1.25	Vdc
Total Device Dissipation @ $T_A = 25^oC$ Derate above 25^oC	P_D	150 2.0			mW $mW/^oC$
Total Device Dissipation @ $T_C = 25^oC$ Derate above 25^oC	P_D	300 4.0			mW $mW/^oC$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +100			^oC

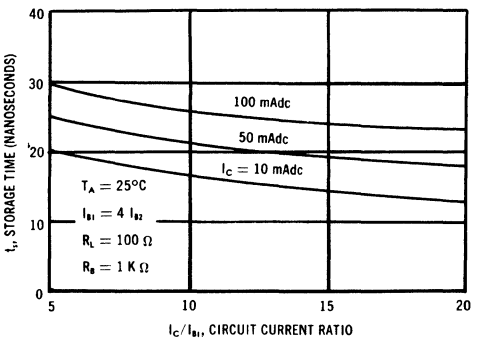
NORMALIZED D C CURRENT TRANSFER RATIO versus COLLECTOR CURRENT



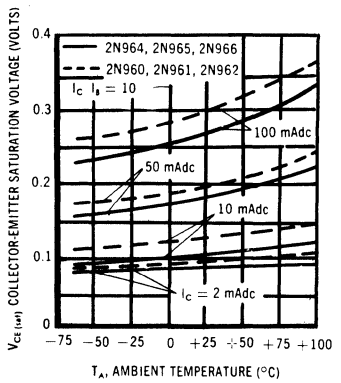
CURRENT GAIN-BANDWIDTH PRODUCT (f_T) versus COLLECTOR CURRENT



STORAGE TIME versus CIRCUIT RATIO



COLLECTOR-EMITTER SATURATION VOLTAGE versus AMBIENT TEMPERATURE



ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	2N960, 2N964	BV_{CBO}	15	25	-	Vdc
	2N961, 2N962, 2N965, 2N966		12	20	-	
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	2N960, 2N964	BV_{EBO}	2.5	-	-	Vdc
	2N961, 2N965		2.0	-	-	
	2N962, 2N966		1.25	-	-	
Collector-Latch-up Voltage V_{CC} = 11.5 Vdc		LV_{CEX}	11.5	-	-	Vdc
Collector-Emitter Cutoff Current (V_{CE} = 15 Vdc)	2N960, 2N964	I_{CES}	-	-	100	μAdc
(V_{CE} = 12 Vdc)	2N961, 2N962, 2N965, 2N966		-	-	100	
Collector-Base Cutoff Current (V_{CB} = 6 Vdc, I_E = 0)		I_{CBO}	-	0.4	3.0	μAdc
DC Current Gain (I_C = 10 mAdc, V_{CE} = 0.3 Vdc)	2N960, 2N961, 2N962	h_{FE}	20	40	-	-
	2N964, 2N965, 2N966		40	70	-	
(I_C = 50 mAdc, V_{CE} = 1 Vdc)	2N960, 2N961, 2N962		20	55	-	
	2N964, 2N965, 2N966		40	90	-	
(I_C = 100 mAdc, V_{CE} = 1 Vdc)	2N960, 2N961, 2N962		20	50	-	
	2N964, 2N965, 2N966		40	85	-	
Collector-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc)	2N964, 2N965, 2N966	$V_{CE(sat)}$	-	0.11	0.18	Vdc
	2N960, 2N961, 2N962		-	0.13	0.20	
(I_C = 50 mAdc, I_B = 5 mAdc)	2N964, 2N965, 2N966		-	0.18	0.35	
	2N960, 2N961, 2N962		-	0.20	0.40	
(I_C = 100 mAdc, I_B = 10 mAdc)	2N964, 2N965, 2N966		-	0.27	0.60	
	2N960, 2N961, 2N962		-	0.30	0.70	
Base-Emitter Saturation Voltage (I_C = 10 mAdc, I_B = 1 mAdc)	All Types	$V_{BE(sat)}$	0.30	0.40	0.50	Vdc
(I_C = 50 mAdc, I_B = 5 mAdc)	All Types		0.40	0.55	0.75	
(I_C = 100 mAdc, I_B = 10 mAdc)	2N960, 2N961, 2N964, 2N965		0.40	0.65	1.00	
	2N962, 2N966		0.40	0.75	1.25	
Current-Gain – Bandwidth Product (I_E = 20 mAdc, V_{CB} = 1.0 Vdc, f = 100 MHz)		f_T	300	460	-	MHz

2N960 SERIES (continued)

ELECTRICAL CHARACTERISTICS (continued)

Characteristic		Symbol	Min	Typ	Max	Unit
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 1 MHz)		C_{ob}	-	2.2	4.0	pF
Emitter Transition Capacitance (V_{EB} = 1 Vdc)		C_{Te}	-	2.0	3.5	pF
Turn-On Time	All Types	t_{on}				ns
(I_C = 10 mAdc, I_{B1} = 5 mAdc, $V_{BE(off)}$ = 1.25 Vdc)			-	35	50	
(I_C = 100 mAdc, I_{B1} = 5 mAdc, $V_{BE(off)}$ = 1.25 Vdc)			-	30	50	
Turn-Off Time		t_{off}				ns
(I_C = 10 mAdc, I_{B1} = 1 mAdc, I_{B2} = 0.25 mAdc)						
	2N960, 2N961, 2N964, 2N965		-	60	85	
	2N962, 2N966		-	80	100	
(I_C = 100 mAdc, I_{B1} = 5 mAdc, I_{B2} = 1.25 mAdc)						
	2N960, 2N961, 2N964, 2N965		-	50	85	
	2N962, 2N966		-	60	100	
Rise Time Constant		τ_{RE}	-	0.6	-	ns
Hole Storage Factor		K'_s	-	16	-	ns
Fall Time Constant		τ_{FE}	-	0.5	-	ns
Total Control Charge		Q_T				pC
(I_C = 10 mAdc, I_B = 1 mAdc)	2N960, 2N961, 2N964, 2N965		-	50	80	
	2N962, 2N966		-	60	90	
(I_C = 100 mAdc, I_B = 5 mAdc)	2N960, 2N961, 2N964, 2N965		-	80	125	
	2N962, 2N966		-	100	150	

2N963 (GERMANIUM)
2N967

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MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	12	Vdc
Collector-Base Voltage	V_{CB}	12	Vdc
Total Device Dissipation @ T_A = 25°C	P_D	150	mW
Derate above 25°C		2.0	mW/°C
Total Device Dissipation @ T_C = 25°C	P_D	300	mW
Derate above 25°C		4.0	mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	100	°C