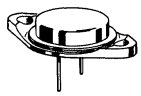
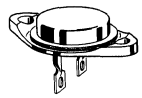
2N3611 thru 2N3614 (GERMANIUM)

PNP germanium power transistors for switching and amplifier applications.



CASE 11
(TO-3)



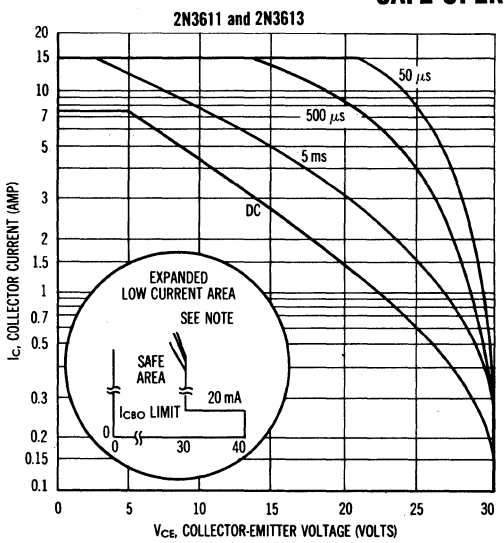
CASE 4-04
(TO-41)

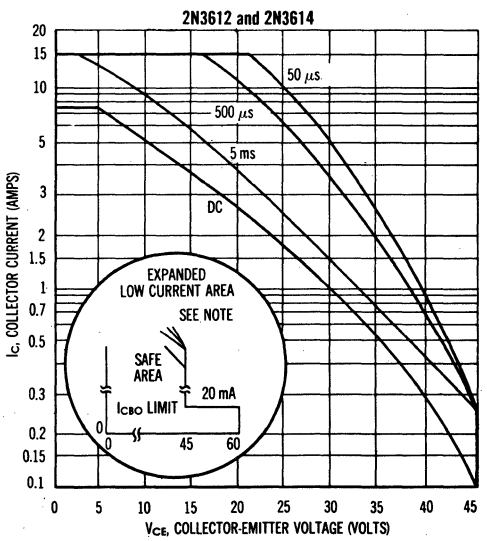
For units with solder lugs attached, specify device MP3611 etc. (TO-41 package)

MAXIMUM RATINGS

Rating	Symbol	2N3611 2N3613	2N3612 2N3614	Unit
Collector-Emitter Voltage	V_{CES}	30	45	Vdc
Collector-Emitter Voltage (Open Base)	V_{CEO}	25	35	Vdc
Collector-Base Voltage	V_{CB}	40	60	Vdc
Emitter-Base Voltage	V_{EB}	20	30	Vdc
Collector Current (Continuous)	I_C	7.0		Adc
Peak Collector Current (PW ≦ 5 msec)	I_C	15		Adc
Base Current (Continuous)	I_B	2.0		Adc
Storage Temperature Range	T_{stg}	-65 to +110		°C
Operating Case Temperature Range	T_C	-65 to +110		°C
Total Device Dissipation @ T_C = 25°C Derate above T_C = 25°C	P_D	77 1.0		Watts W/°C
Thermal Resistance, Junction to Case	θJC	1.1		°C/W
Thermal Resistance, Case to Ambient	θCA	32.7		°C/W

SAFE OPERATING AREAS





The Safe Operating Area Curves indicate I_C-V_{CE} limits below which the device will not go into secondary breakdown. Collector load lines for specific circuits must fall within the applicable Safe Area to avoid causing a collector-emitter short. (Case temperature and duty cycle of the excursions make no significant change in these safe areas.) The load line may exceed the BV_{CES} voltage limit only if the collector current has been reduced to 20 mA or less before or at the BV_{CES} limit; then and only then may the load line be extended to the absolute maximum voltage rating of BV_{CBO}. To insure operation below the maximum T_J, the power-temperature derating curve must be observed for both steady state and pulse power conditions.

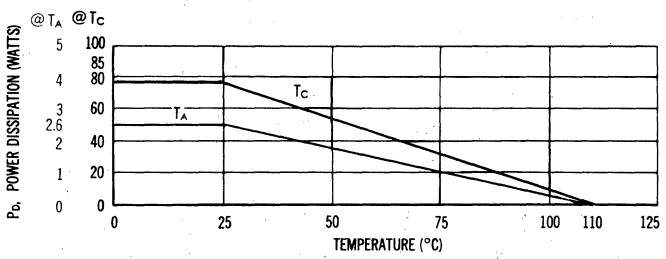
ELECTRICAL CHARACTERISTICS

Characteristics		Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage* (I_C = 250 mAdc)	2N3611, 2N3613	BV_{CES}*	30	–	Vdc
	2N3612, 2N3614		45	–	
Collector-Emitter Breakdown Voltage* (I_C = 500 mAdc)	2N3611, 2N3613	BV_{CEO}*	25	–	Vdc
	2N3612, 2N3614		35	–	
Floating Potential (V_{CB} = V_{CB} max)		V_{EBF}	–	1.0	Vdc
Collector-Emitter Leakage Current (V_{CE} = 1/2 V_{CEO} max)		I_{CEO}	–	30	mAdc
Collector-Emitter Leakage Current (V_{CE} = V_{CE} max, V_{BE} = 1.0 Vdc, T_C = +100°C)		I_{CEX}	–	10	mAdc
Collector-Base Cutoff Current (V_{CB} = 2 Vdc)		I_{CBO}	–	.040	mAdc
(V_{CB} = 25 Vdc)	2N3611, 2N3613		–	0.5	
(V_{CB} = 40 Vdc)	2N3612, 2N3614		–	0.5	
(V_{CB} = V_{CB} max)			–	5.0	
Emitter-Base Cutoff Current (V_{EB} = V_{EB} max)		I_{EBO}	–	500	μAdc
Collector-Emitter Saturation Voltage (I_C = 3 Adc, I_B = 300 mAdc)		$V_{CE(sat)}$	–	0.25	Vdc
(I_C = 7 Adc, I_B = 700 mAdc)			–	0.35	
Base-Emitter Saturation Voltage (I_C = 3 Adc, I_B = 300 mAdc)	2N3611, 2N3612	$V_{BE(sat)}$	–	0.7	Vdc
	2N3613, 2N3614		–	0.6	
(I_C = 7 Adc, I_B = 700 mAdc)	2N3611, 2N3612		–	1.1	
	2N3613, 2N3614		–	0.9	
Transconductance (I_C = 3 Adc, V_{CE} = 2 Vdc)	2N3611, 2N3612	g_{FE}	3.0	–	mhos
	2N3613, 2N3614		3.5	–	
Small Signal Current Gain (I_C = 0.5 A, V_{CE} = 12 V, f = 20 kHz)		h_{fe}	15	–	–
(I_C = 0.5 A, V_{CE} = 2 V, f = 1 kHz)	2N3611, 2N3612		40	100	
	2N3613, 2N3614		60	150	
DC Current Gain (I_C = 3 Adc, V_{CE} = 2 Vdc)	2N3611, 2N3612	h_{FE}	35	70	–
	2N3613, 2N3614		60	120	
(I_C = 7 Adc, V_{CE} = 2 Vdc)	2N3611, 2N3612		20	–	
	2N3613, 2N3614		30	–	

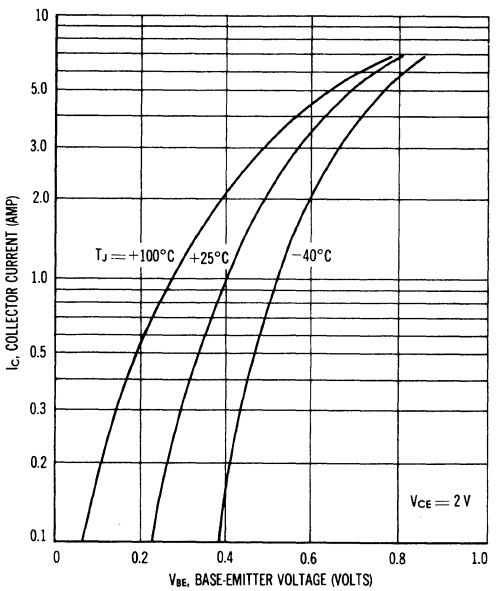
*Sweep Test: 1/2 sine wave, 60 Hz

These transistors are also subject to safe area curves. Both limits are applicable and must be observed.

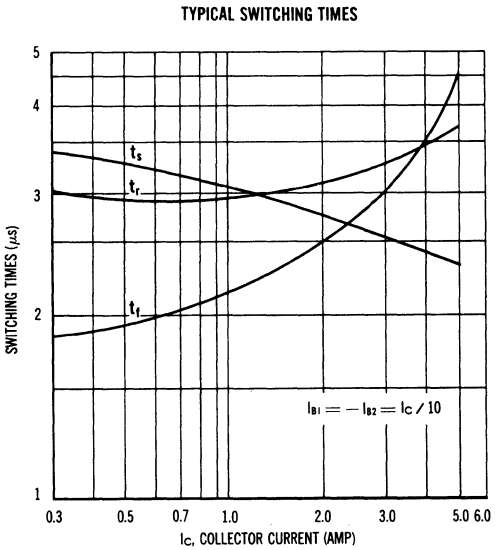
POWER-TEMPERATURE DERATING CURVE



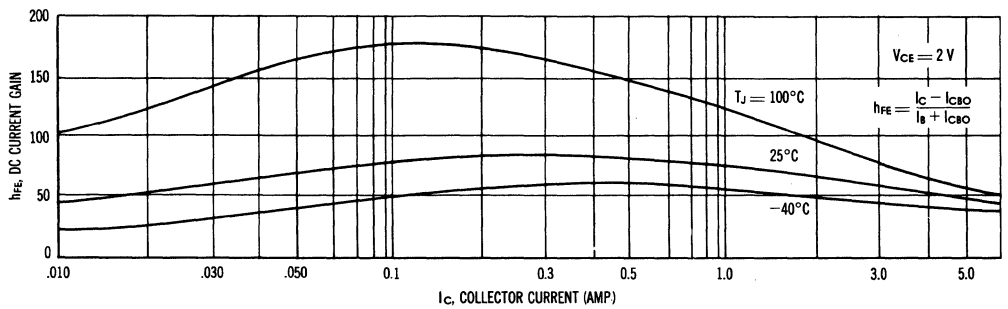
COLLECTOR CURRENT versus BASE-EMITTER VOLTAGE



TYPICAL SWITCHING TIMES



DC CURRENT GAIN versus COLLECTOR CURRENT



COLLECTOR-EMITTER SATURATION VOLTAGE VARIATIONS