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RF Power Transistors

2N5102

TO-60

High-Power Silicon N-P-N Overlay Transistor

For Class C, AM Operation in VHF Circuits

Features:

- **15 W output min. at 136 MHz**
- **For 24 V aircraft communication**
- **Load mismatch protection**
- **High voltage ratings**
- **Emitter grounded to case**

MAXIMUM RATINGS, *Absolute-Maximum Values:*

*COLLECTOR-TO-BASE VOLTAGE	V_{CBO}	90	V
COLLECTOR-TO-EMITTER VOLTAGE:			
With base-emitter junction reverse-biased, $V_{BE} = -1.5$ V	V_{CEV}	100	V
*With external base-to-emitter resistance, $R_{BE} = 5\ \Omega$	V_{CER}	50	V
*EMITTER-TO-BASE VOLTAGE	V_{EBO}	4	V
*CONTINUOUS COLLECTOR CURRENT	I_C	3.3	A
PEAK COLLECTOR CURRENT		10	A
*CONTINUOUS BASE CURRENT	I_B	1	A
*TRANSISTOR DISSIPATION:	P_T		
At case temperatures up to 25°C		70	W
At case temperatures above 25°C		See Fig. 6	
*TEMPERATURE RANGE:			
Storage & Operating (Junction)		−65 to 200	°C
*LEAD TEMPERATURE (During soldering):			
At distances ≥ 1/32 in. (0.8 mm) from insulating wafer for 10 s max		230	°C

*In accordance with JEDEC registration data.

ELECTRICAL CHARACTERISTICS, *At Case Temperature (T_C) = 25°C unless otherwise specified*

CHARACTERISTIC	SYMBOL	TEST CONDITIONS						LIMITS		UNITS
		VOLTAGE V dc			CURRENT mA dc					
		V_{CB}	V_{CE}	V_{BE}	I_E	I_B	I_C	MIN.	MAX.	
* Collector Cutoff Current: With base-emitter junction reverse biased	I_{CEV}		83	−1.5				–	20	mA
* At T_C = 150°C			30	−1.5				–	10	
With external base-to-emitter resistance (R_{BE}) = 5 Ω	I_{CER}		50					–	10	
* Emitter Cutoff Current	I_{EBO}			−4				–	10	mA
* Collector-to-Emitter Sustaining Voltage: With base-emitter junction reverse biased	$V_{CEV(sus)}$			−1.5			600[a]	100	–	V
With external base-to-emitter resistance (R_{BE}) = 5 Ω	$V_{CER(sus)}$						200[a]	50	–	
With base open	$V_{CEO(sus)}$					0	200[a]	35	–	
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$				10		0	4	–	V
* DC Forward Current Transfer Ratio	h_{FE}		4 4				3 A 0.5 A	10 10	– 100	
* Magnitude of Common-Emitter, Small-Signal, Short-Circuit Forward Current Transfer Ratio (f = 150 MHz)	$\lvert h_{fe} \rvert$		24				500	1	–	
* Output Capacitance (f = 1 MHz)	C_{ob}	30			0			–	85	pF
* Available Amplifier Signal Input Power[b] (P_o = 15 W, Z_G = 50 Ω, f = 136 MHz)	P_i							–	6	W
* Collector Circuit Efficiency (P_{IE} = 6 W, Z_G = 50 Ω, f = 136 MHz)	η_C							70	–	%
Modulation[c] (f = 118 MHz)	M		24 (V_{CC})					80	–	%
Load Mismatch[d] (f = 118 MHz)	LM		24 (V_{CC})				1100	Will not be damaged		
Dynamic Input Impedance (See Fig. 10) (P_{IE} = 6 W, f = 150 MHz)	Z_{IN}		24 (V_{CC})					1.7 + j 2.6 (typ)		Ω
Thermal Resistance (Junction to Case)	$R_{\theta JC}$							–	2.5	°C/W

*In accordance with JEDEC registration data.

[a]Pulsed through a 9-mH inductor; duty factor = 50%.

[b]Unmodulated carrier.

[c]See Figs. 9 & 10. Carrier Power, P_{CAR} = 15 W;

V_{CC} modulation = 100%; $M = \sqrt{\frac{2\,(P_{AM} - P_{CAR})}{P_{CAR}}} \times 100\%$.

[d]Under conditions of *footnote* c, the transistor is subjected to all conditions of load mismatch from short-circuit to open-circuit.