NEC

SILICON TRANSISTORS
2SD1615, 2SD1615A

NPN SILICON EPITAXIAL TRANSISTORS
POWER MINI MOLD

DESCRIPTION

2SD1615, 1615A are designed for audio frequency power amplifier and switching application, especially in Hybrid Integrated Circuits.

FEATURES

- World Standard Miniature Package
- Low $V_{CE\ (sat)}$ $V_{CE(sat)}$ = 0.15 V
- Complement to 2SB1115, 2SD1115A

ABSOLUTE MAXIMUM RATINGS

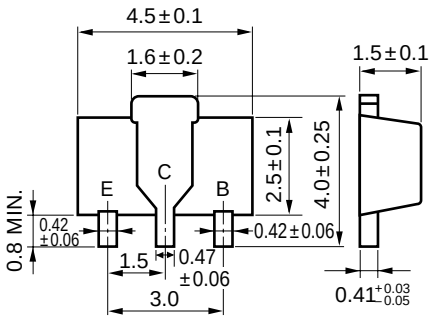
Maximum Voltages and Currents (T_A = 25 ˚C)		2SD1615	2SD1615A	
Collector to Base Voltage	V_{CBO}	60	120	V
Collector to Emitter Voltage	V_{CEO}	50	60	V
Emitter to Base Voltage	V_{EBO}	6		A
Collector Current (DC)	I_C	1		A
Collector Current (Pulse)*	I_C	2		A
Maximum Power Dissipation				
Total Power Dissipation at 25 ˚C Ambient Temperature**	P_T	2.0		W
Maximum Temperatures				
Junction Temperature	T_j	150		˚C
Storage Temperature Range	T_{stg}	–55 to +150		˚C

* PW ≤ 10 ms, Duty Cycle ≤ 50 %

** When mounted on ceramic substrate of 16 $cm^2 \times 0.7$ mm

PACKAGE DIMENSIONS

in millimeters



1. Emitter
2. Collector
3. Base

ELECTRICAL CHARACTERISTICS (T_A = 25 ˚C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS	
Collector Cutoff Current	I_{CBO}			100	nA	2SD1615	V_{CB} = 60 V, I_E = 0
				100	nA	2SD1615A	V_{CB} = 120 V, I_E = 0
Emitter Cutoff Current	I_{EBO}			100	nA	V_{EB} = 6.0 V, I_C = 0	
DC Current Gain	h_{FE1}***	135	290	600		2SC1615	V_{CE} = 2.0 V, I_C = 100 mA
		135		400		2SD1615A	
DC Current Gain	h_{FE2}***	81	270			V_{CE} = 2.0 V, I_C = 1.0 A	
Collector Saturation Voltage	$V_{CE(sat)}$***		0.15	0.3	V	I_C = 1.0 A, I_B = 50 mA	
Base Saturation Voltage	$V_{BE(sat)}$***		0.9	1.2	V	I_C = 1.0 A, I_B = 50 mA	
Base to Emitter Voltage	V_{BE}***	600		700	mV	V_{CE} = 2.0 V, I_C = 50 mA	
Gain Bandwidth Product	f_T	80	160		MHz	V_{CE} = 2.0 V, I_E = –100 mA	
Output Capacitance	C_{ob}		19		pF	V_{CB} = 10 V, I_E = 0, f = 1.0 MHz	

*** Pulsed: PW ≤ 350 μs, Duty Cycle ≤ 2 %

h_{FE} Classification

MARKING	2SD1615	GM	GL	GK
	2SD1615A	GQ	GP	
h_{FE}		135 to 270	200 to 400	300 to 600

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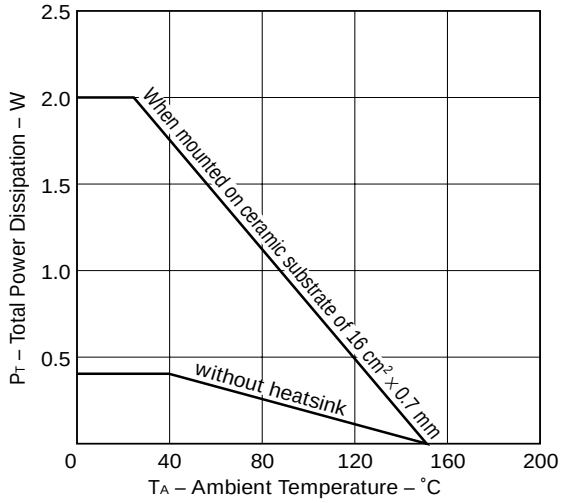
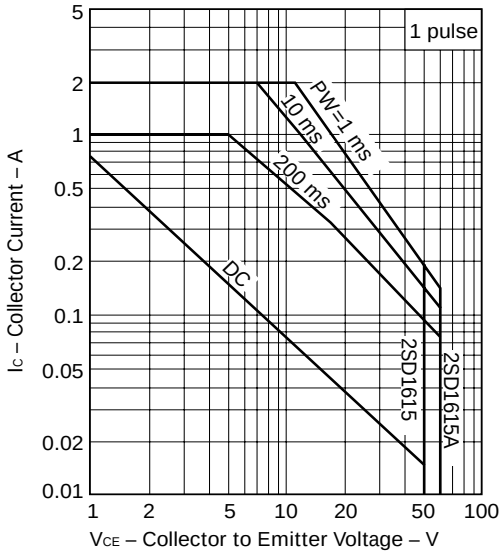
TYPICAL CHARACTERISTICS (T_A = 25 ˚C)

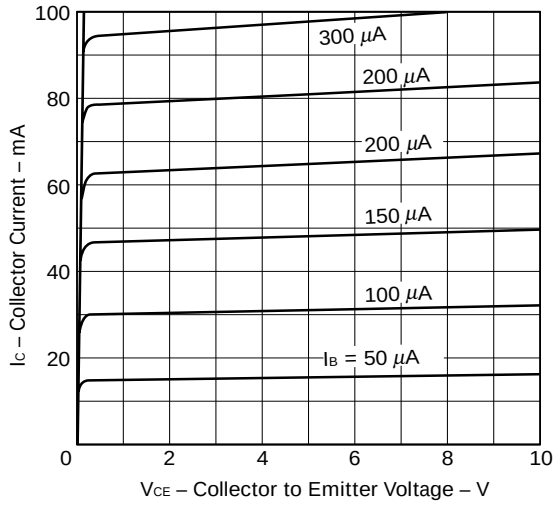
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



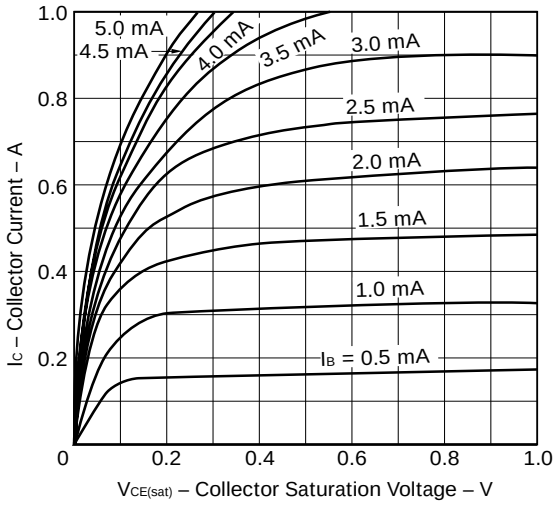
SAFE OPERATING AREA (TRANSIENT THERMAL RESISTANCE METHOD)



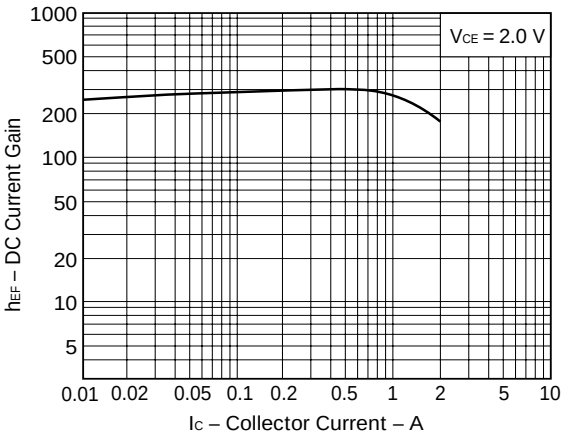
COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



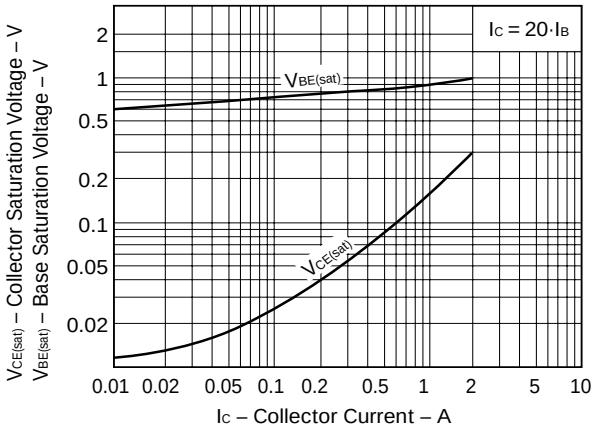
COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



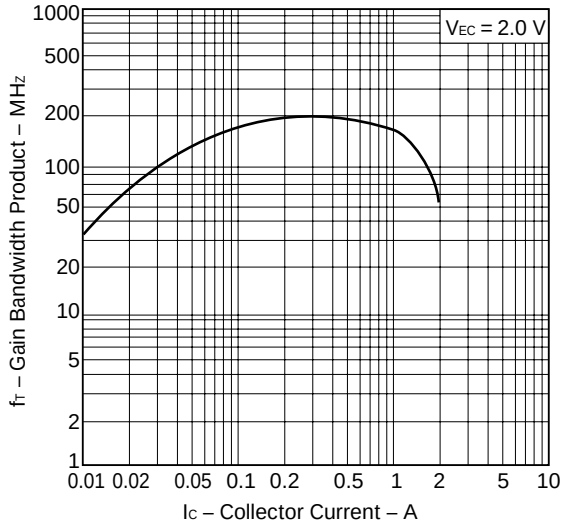
DC CURRENT GAIN vs. COLLECTOR CURRENT



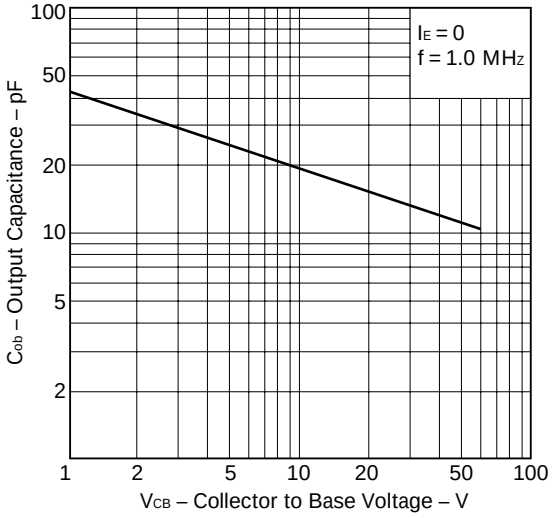
COLLECTOR AND BASE SATURATION VOLTAGE vs. COLLECTOR CURRENT



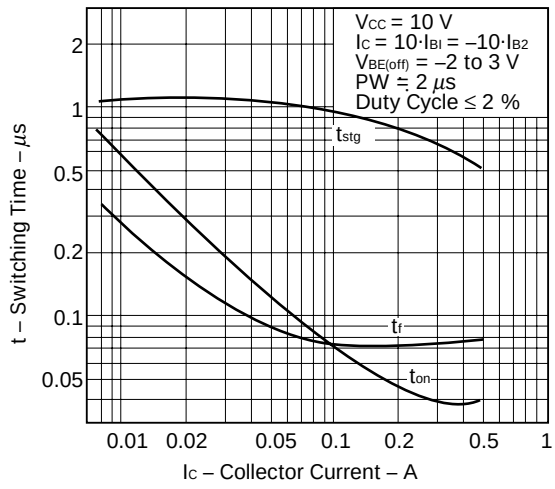
GAIN BANDWIDTH PRODUCT vs.
EMITTER CURRENT



OUTPUT CAPCITANCE vs.
COLLECTOR TO BASE VOLTAGE



SWITCHING TIME vs.
COLLECTOR CURRENT



REFERENCE

Document Name	Document No.
NEC semiconductor device reliability/quality control system.	TEI-1202
Quality grade on NEC semiconductor devices.	IEI-1209
Semiconductor device mounting technology manual.	IEI-1207
Semiconductor device package manual.	IEI-1213
Guide to quality assurance for semiconductor devices.	MEI-1202
Semiconductor selection guide.	MF-1134

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