

RoHS Compliant Product  
A suffix of "-C" specifies halogen & lead-free

### FEATURES

- High Voltage Application
- Telephone Application

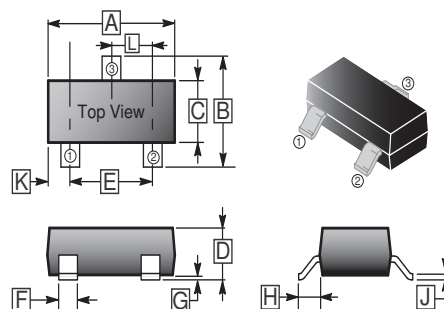
### MARKING

1Z

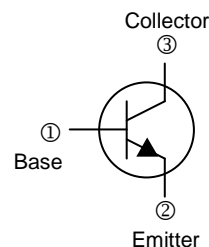
### PACKAGE INFORMATION

Package	MPQ	Leader Size
SOT-23	3K	7 inch

### SOT-23



REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	2.70	3.10	G	0.09	0.18
B	2.10	2.65	H	0.35	0.65
C	1.20	1.40	J	0.08	0.20
D	0.89	1.17	K	0.6 REF.	
E	1.78	2.04	L	0.95 BSC.	
F	0.30	0.50			



### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C unless otherwise specified)

Parameter	Symbol	Rating	Unit	
Collector-Base Voltage	V <sub>CBO</sub>	350	V	
Collector-Emitter Voltage	V <sub>CEO</sub>	350	V	
Emitter-Base Voltage	V <sub>EBO</sub>	5	V	
Collector Current-Continuous	I <sub>C</sub>	500	mA	
Base Current	I <sub>B</sub>	250	mA	
Total Device Dissipation <sup>1</sup>	P <sub>D</sub>	T <sub>A</sub> =25°C	225	mW
		Derate above 25°C	1.8	mW /°C
Thermal Resistance from Junction to Ambient <sup>1</sup>	R <sub>θJA</sub>	556	°C/ W	
Total Device Dissipation <sup>2</sup>	P <sub>D</sub>	T <sub>A</sub> =25°C	300	mW
		Derate above 25°C	2.4	mW /°C
Thermal Resistance from Junction to Ambient <sup>2</sup>	R <sub>θJA</sub>	417	°C/ W	
Junction and Storage Temperature	T <sub>J</sub> , T <sub>STG</sub>	-55~150	°C	

Notes:

1. FR-5 board : 1 × 0.75 × 0.062 inch.
2. Alumina substrate : 0.4 × 0.3 × 0.024 inch, 99.5% alumina.

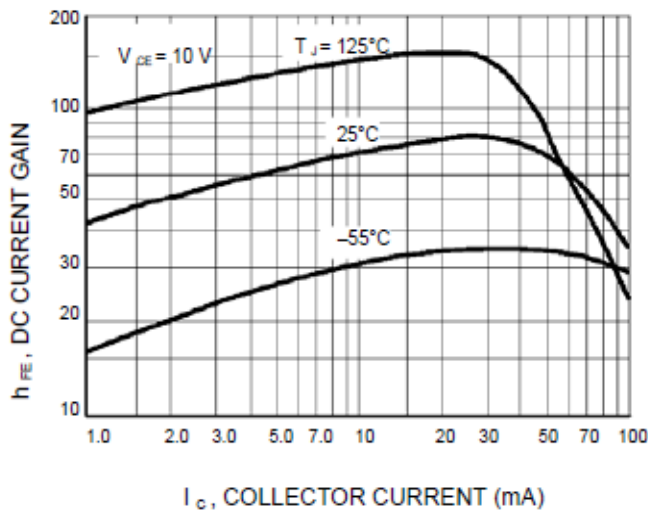
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
<b>Off Characteristics</b>						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	350	-	-	V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	350	-	-	V	$I_C=1\text{mA}$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	-	-	V	$I_E=10\mu\text{A}$
Collector Cutoff Current	$I_{CBO}$	-	-	50	nA	$V_{CB}=250\text{V}$
Emitter Cutoff Current	$I_{EBO}$	-	-	50	nA	$V_{EB}=5\text{V}$
<b>On Characteristics</b>						
DC Current Gain	$h_{FE}$	20	-	-	V	$V_{CE}=10\text{V}, I_C=1\text{mA}$
		30	-	-		$V_{CE}=10\text{V}, I_C=10\text{mA}$
		30	-	200		$V_{CE}=10\text{V}, I_C=30\text{mA}$
		20	-	200		$V_{CE}=10\text{V}, I_C=50\text{mA}$
		15	-	-		$V_{CE}=10\text{V}, I_C=100\text{mA}$
Collector-Emitter Saturation Voltage <sup>1</sup>	$V_{CE(sat)}$	-	-	0.3	V	$I_C=10\text{mA}, I_B=1\text{mA}$
		-	-	0.35		$I_C=20\text{mA}, I_B=2\text{mA}$
		-	-	0.5		$I_C=30\text{mA}, I_B=3\text{mA}$
		-	-	1		$I_C=50\text{mA}, I_B=5\text{mA}$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$	-	-	0.75	V	$I_C=10\text{mA}, I_B=1\text{mA}$
		-	-	0.85		$I_C=20\text{mA}, I_B=2\text{mA}$
		-	-	0.9		$I_C=30\text{mA}, I_B=3\text{mA}$
Base-Emitter on Voltage	$V_{BE(on)}$	-	-	2	V	$I_C=100\text{mA}, V_{CE}=10\text{V}$
<b>Small-Signal Characteristics</b>						
Transition Frequency	$f_T$	40	-	200	MHz	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=20\text{MHz}$
Collector-Base Capacitance	$C_{cb}$	-	6	-	pF	$V_{CB}=20\text{V}, f=1\text{MHz}$
Emitter-Base Capacitance	$C_{eb}$	-	80	-	pF	$V_{EB}=0.5\text{V}, f=1\text{MHz}$

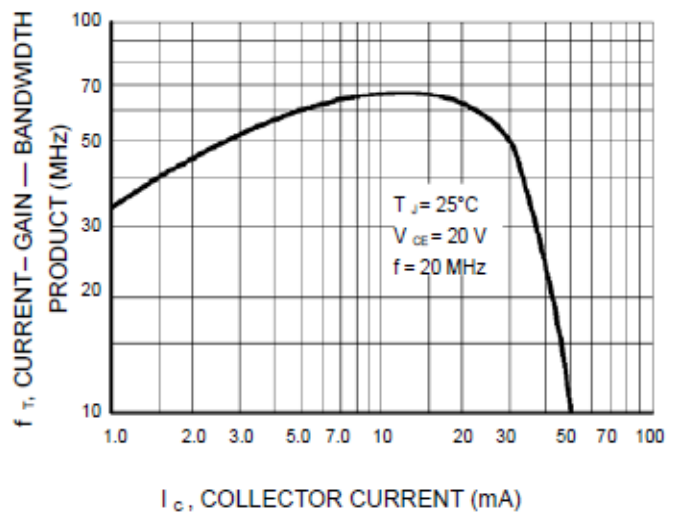
Notes:

1. Pulse test : Pulse width=300 $\mu\text{s}$ , duty cycle=2%.

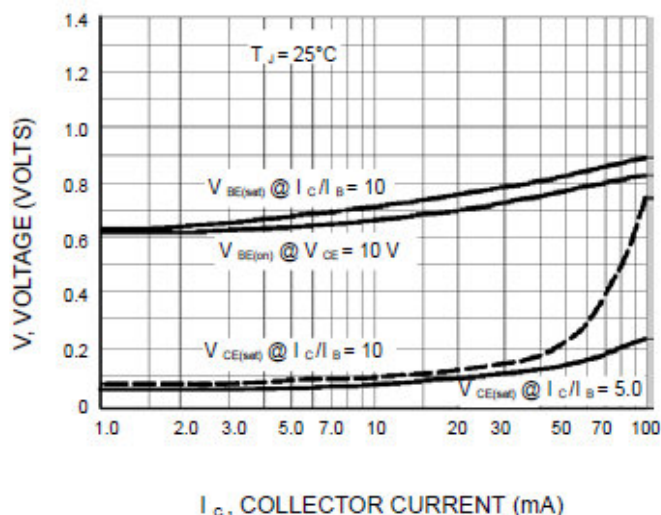
**CHARACTERISTIC CURVES**



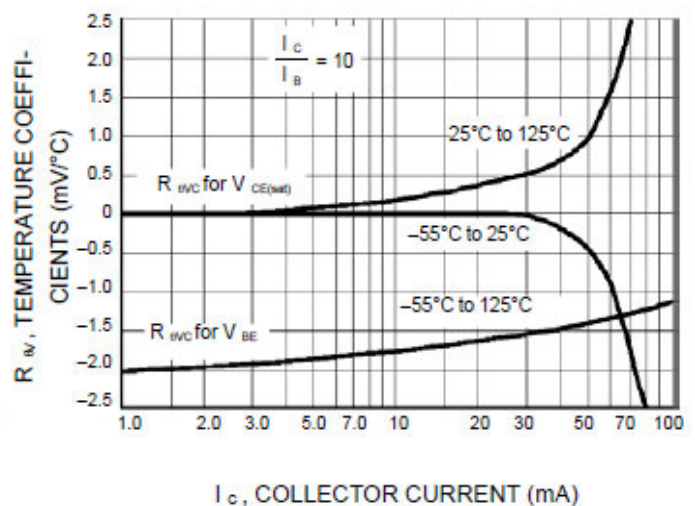
$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 1. DC Current Gain**



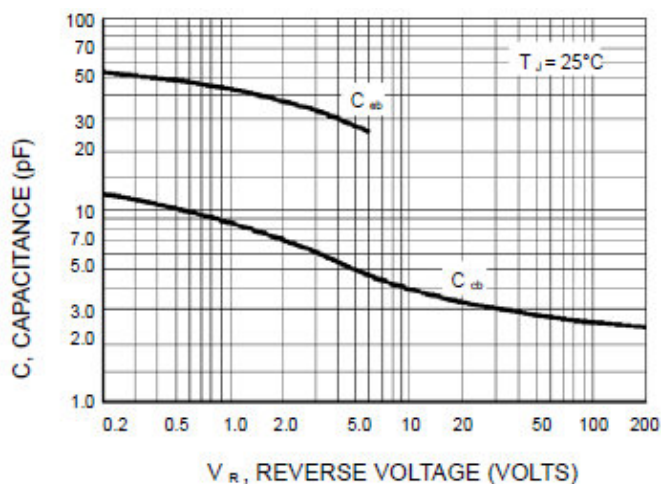
$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 2. Current-Gain — Bandwidth Product**



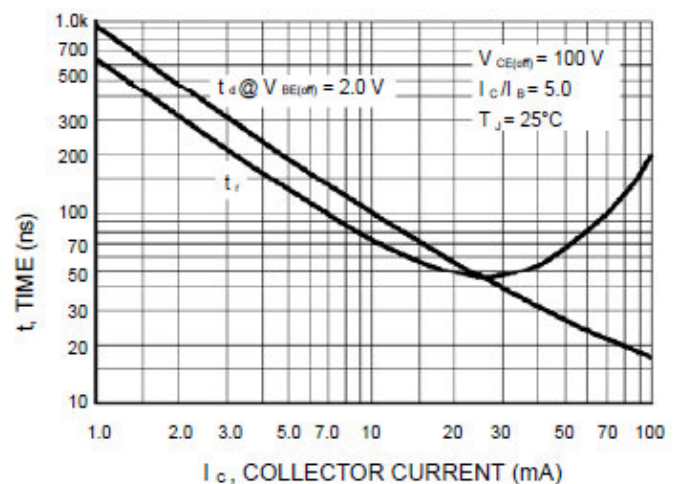
$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 3. "On" Voltages**



$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 4. Temperature Coefficients**

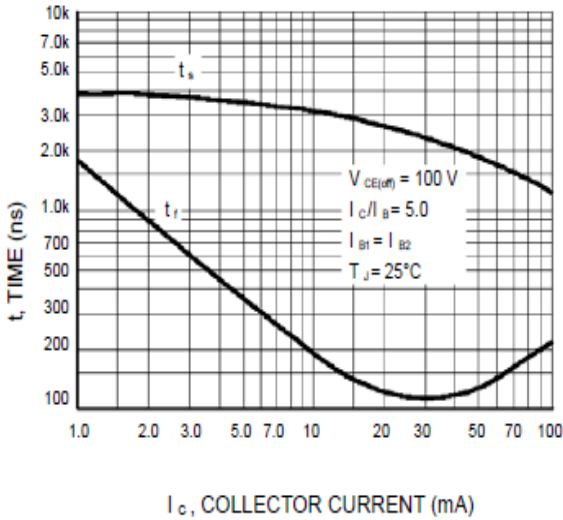


$V_R$ , REVERSE VOLTAGE (VOLTS)  
**Figure 5. Capacitance**

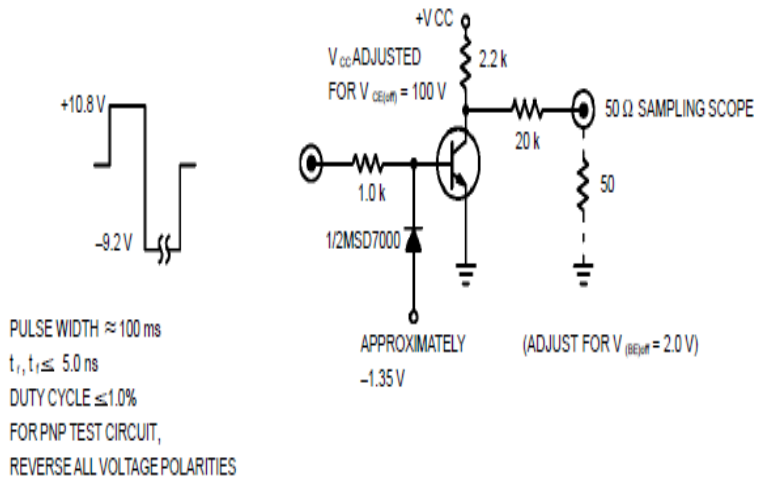


$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 6. Turn-On Time**

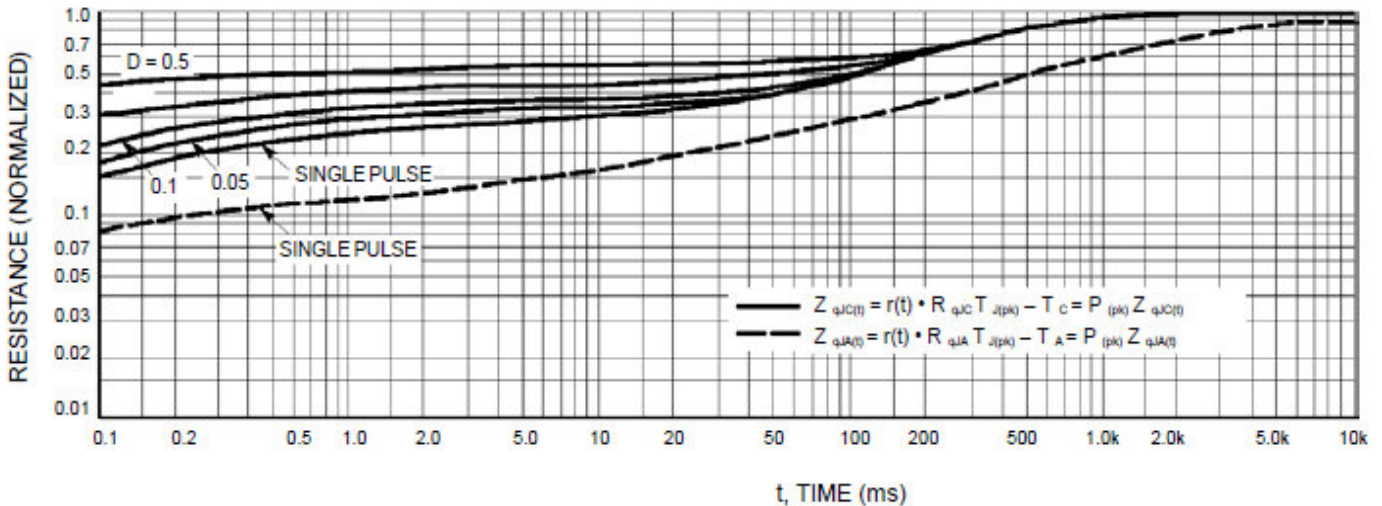
**CHARACTERISTIC CURVES**



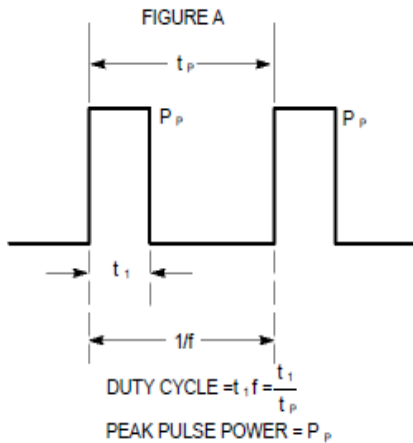
$I_C$ , COLLECTOR CURRENT (mA)  
**Figure 7. Turn-Off Time**



**Figure 8. Switching Time Test Circuit**



**Figure 9. Thermal Response**



**Design Note: Use of Transient Thermal Resistance Data**