

## NPN Transistor with Dual Series Switching Diode

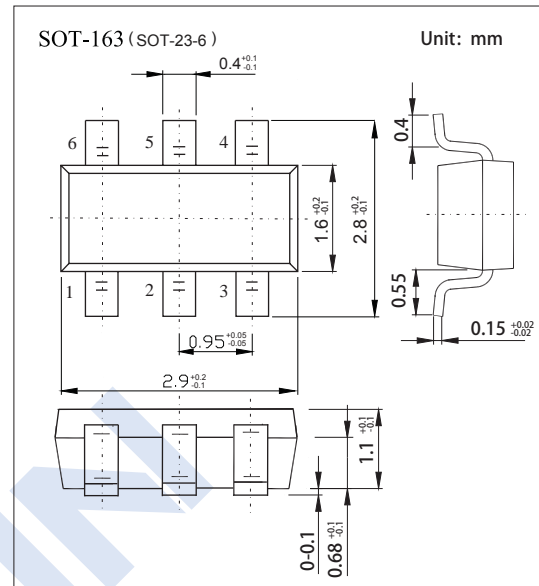
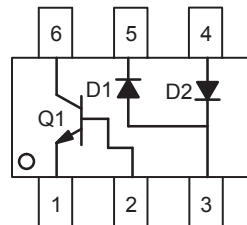
## 2KF7200

## ■ Features

NPN Transistor

●  $V_{CE0} = 80V$ ●  $I_C = 500mA$ 

Switching Diode

●  $V_R = 100V$ ●  $I_F = 200mA$ 

## ■ Absolute Maximum Ratings

## NPN Transistor

Parameter	Symbol	Rating	Unit
Collector - Base Voltage	$V_{CBO}$	80	V
Collector - Emitter Voltage	$V_{CEO}$	80	
Emitter - Base Voltage	$V_{EBO}$	6	
Collector Current - Continuous	$I_C$	500	mA

## Switching Diode

Parameter	Symbol	Rating	Unit
Reverse Voltage	$V_R$	100	V
Forward Current	$I_F$	200	mA
Non-Repetitive Peak Forward Current (Square Wave, $T_J = 25^\circ C$ prior to surge)	$I_{FSM}$	$t < 1 \text{ sec}$	1
		$t = 1 \mu\text{sec}$	20

## Thermal Characteristics

Parameter	Symbol	Rating	Unit
Total Device Dissipation FR-5 Board	$P_D$	400	mW
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	313	$^\circ C/W$
Total Device Dissipation FR-5 Board	$P_D$	270	mW
Thermal Resistance from Junction-to-Ambient	$R_{\theta JA}$	463	$^\circ C/W$
Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55 to 150	

Notes 1. FR-5 = 650 mm<sup>2</sup> pad, 2.0 oz Cu.2. FR-5 = 10 mm<sup>2</sup> pad, 2.0 oz Cu.

## 2KF7200

■ Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise specified.)

## NPN Transistor

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Collector-emitter breakdown voltage	V <sub>CEO</sub>	I <sub>C</sub> = 1 mA, I <sub>B</sub> = 0	80			V
Emitter - base breakdown voltage	V <sub>EB0</sub>	I <sub>E</sub> = 100μA, I <sub>C</sub> = 0	6			
Collector-base cut-off current	I <sub>CB0</sub>	V <sub>CB</sub> = 80 V, I <sub>E</sub> = 0			100	nA
Collector-emitter cut-off current	I <sub>CES</sub>	V <sub>CE</sub> = 60 V, I <sub>B</sub> = 0			100	
<b>On Characteristics (Note 3)</b>						
Collector-emitter saturation voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 100 mA, I <sub>B</sub> = 10mA			0.3	V
Base - emitter saturation voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 100 mA, I <sub>B</sub> = 10mA			1.2	
DC current gain	h <sub>FE</sub>	I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 1.0 V	120			
<b>Small-Signal Characteristics</b>						
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 10mA, f = 100MHz	150			MHz

## Switching Diode

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Reverse breakdown voltage	V <sub>(BR)</sub>	I <sub>R</sub> = 100 μA	75			V
Forward voltage	V <sub>F1</sub>	I <sub>F</sub> = 1 mA			0.715	
	V <sub>F2</sub>	I <sub>F</sub> = 10mA			0.855	
	V <sub>F3</sub>	I <sub>F</sub> = 50mA			1.0	
	V <sub>F4</sub>	I <sub>F</sub> = 150 mA			1.25	
Reverse voltage leakage current	I <sub>R</sub>	V <sub>R</sub> = 75 V			1	μA
		V <sub>R</sub> = 20 V, T <sub>J</sub> = 150°C			30	
		V <sub>R</sub> = 75 V, T <sub>J</sub> = 150°C			100	
Diode capacitance	C <sub>D</sub>	V <sub>R</sub> = 0 V, f = 1 MHz			2.0	pF
Reverse recovery time	t <sub>rr</sub>	I <sub>F</sub> = I <sub>R</sub> = 10mA, I <sub>R(REC)</sub> = 1.0 mA, R <sub>L</sub> = 100Ω			6.0	ns
Forward recovery voltage	V <sub>FR</sub>	I <sub>F</sub> = 10mA, t <sub>r</sub> = 20 ns			1.75	V

Notes 3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

## ■ Marking

Marking	3NP
---------	-----

2KF7200

Typical Characteristics

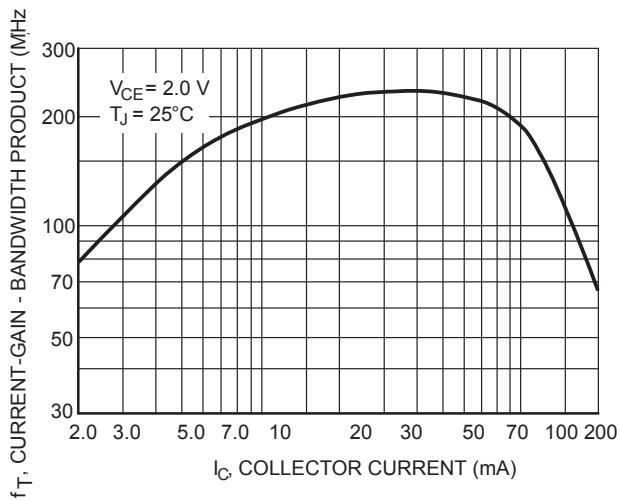


Figure 1. Current Gain — Bandwidth Product

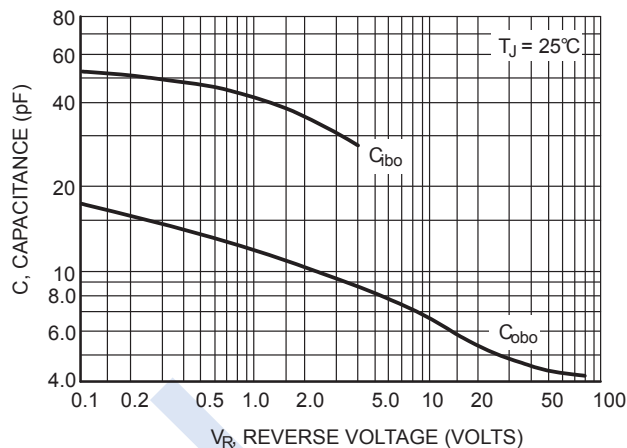


Figure 2. Capacitance

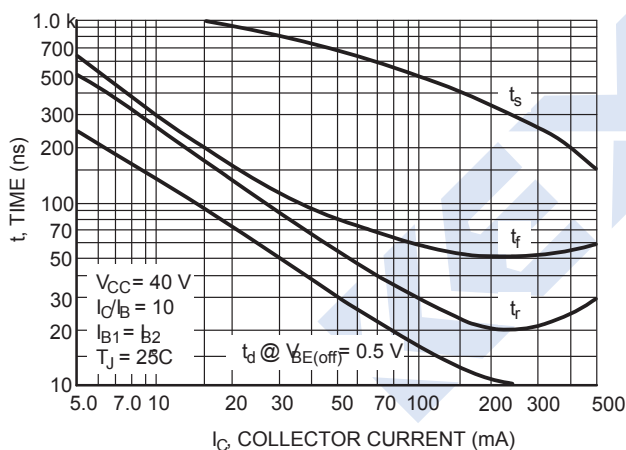


Figure 3. Switching Time

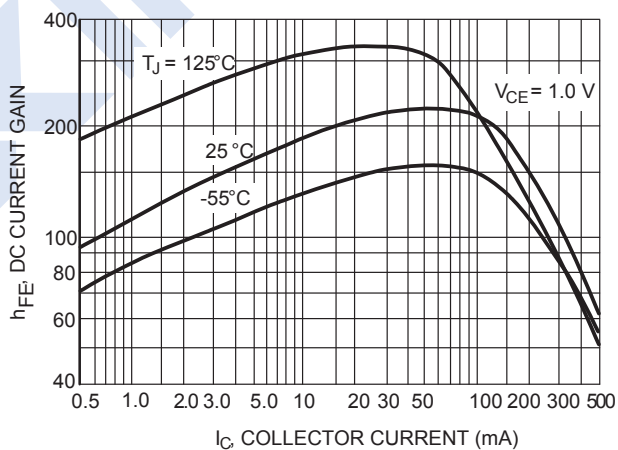


Figure 4. DC Current Gain

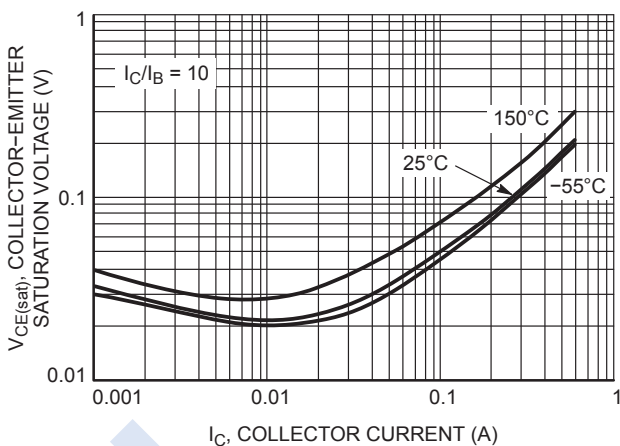


Figure 5. Collector Emitter Saturation Voltage vs. Collector Current

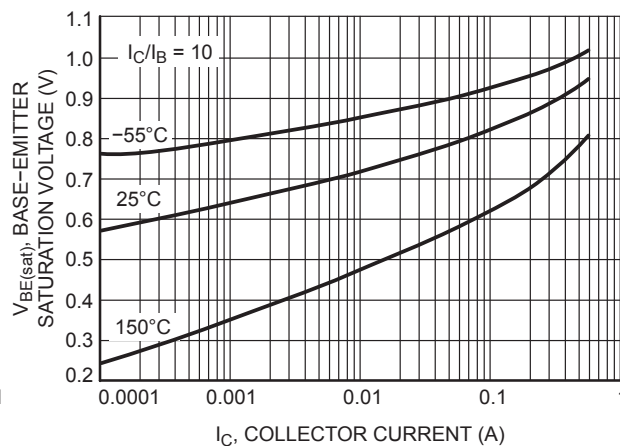


Figure 6. Base Emitter Saturation Voltage vs. Collector Current

2KF7200

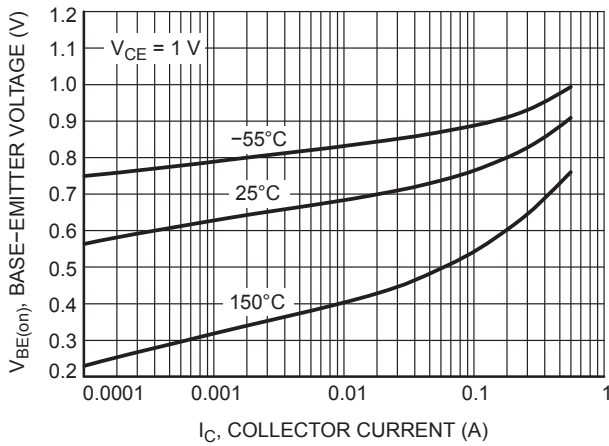


Figure 7. Base-Emitter Voltage vs. Collector Current

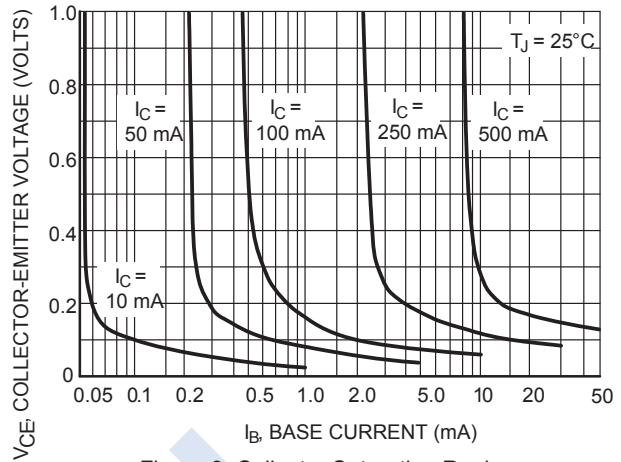


Figure 8. Collector Saturation Region

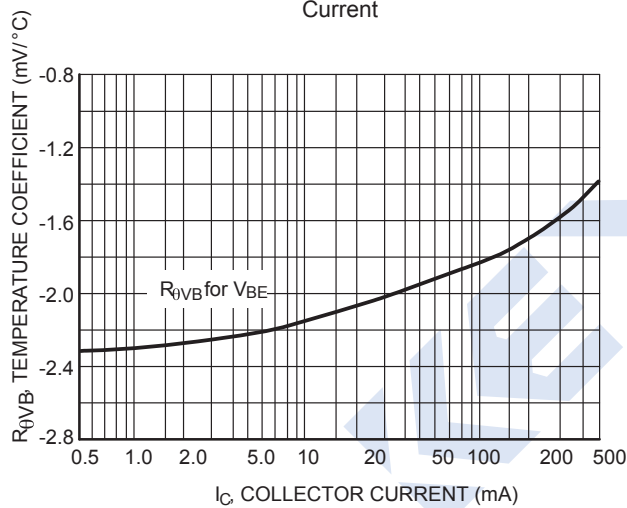


Figure 9. Base-Emitter Temperature Coefficient

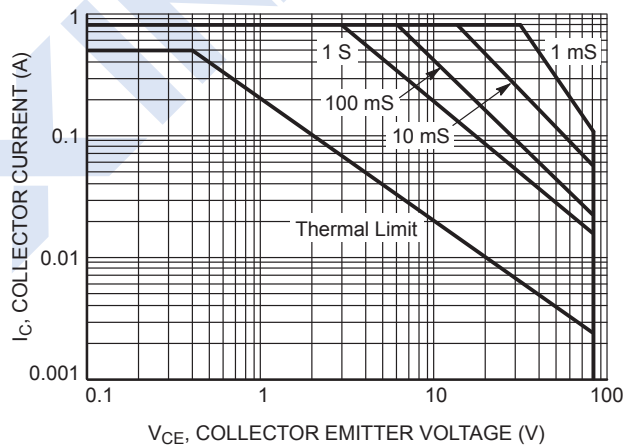


Figure 10. Safe Operating Area

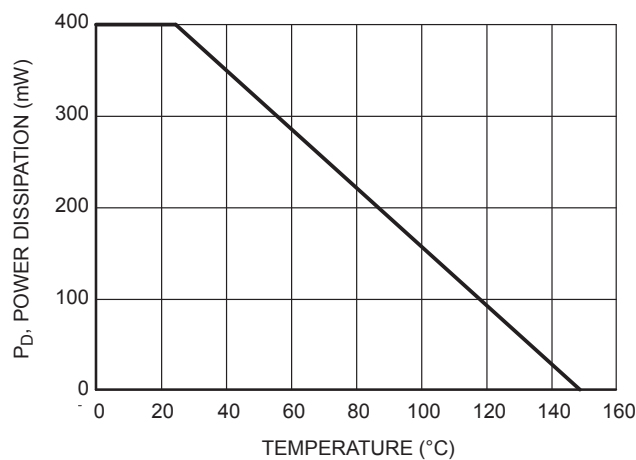


Figure 11. Operating Temperature Derating

2KF7200

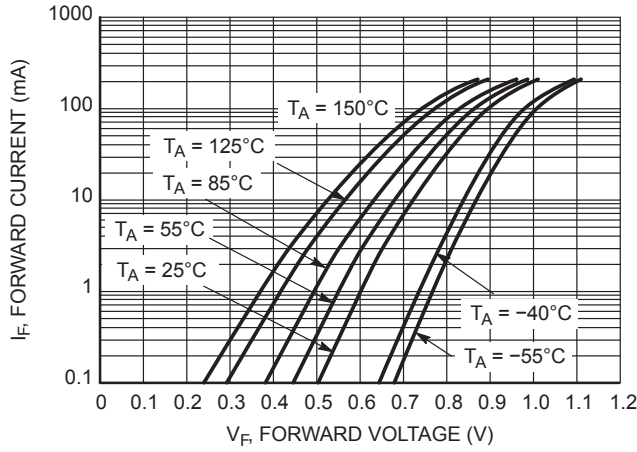


Figure 12. Forward Voltage

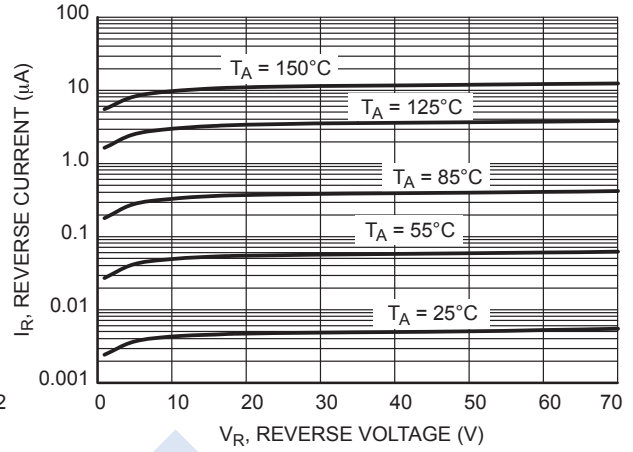


Figure 13. Leakage Current

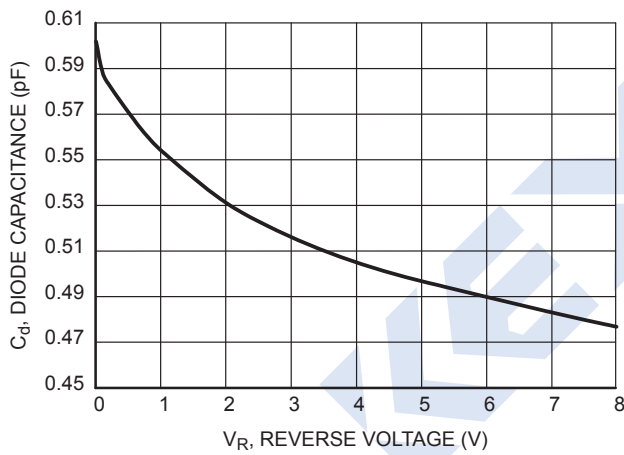


Figure 14. Capacitance

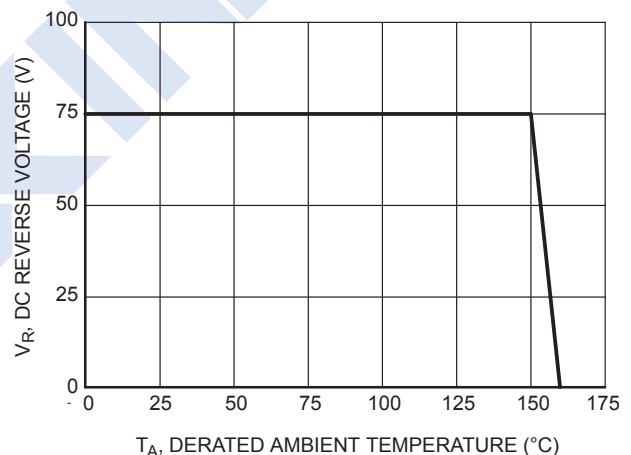


Figure 15. Diode Power Dissipation Curve