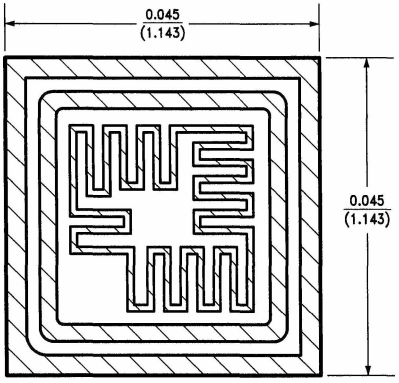
National Semiconductor

Process 36
NPN High Voltage Power



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DESCRIPTION

Process 36 is a non-overlay, double-diffused, silicon epitaxial planar device with a field plate.

APPLICATION

This device is designed for use in horizontal driver, class A off-line amplifier and off-line switching applications.

PRINCIPAL DEVICE TYPES

TO-202 EBC: D40P1, 3, 5
NSD36-36C

TO-237 EBC: 2N6720-23, TN3440

TO-39: 2N3440

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

Symbol	Conditions	Min	Typ	Max	Units
BV_{CEO}	I_{CE} = 1 mA (Note 1)	200	300		V
BV_{CBO}	I_{CB} = 100 μA	225	325		V
BV_{EBO}	I_{EB} = 10 μA	6			V
I_{CEO}	V_{CE} = 200V			10	μA
I_{CBO}	V_{CB} = 225V			0.5	μA
I_{EBO}	V_{EB} = 5V			0.1	μA
h_{FE}	I_C = 50 mA, V_{CE} = 10V (Note 1) I_C = 100 mA, V_{CE} = 10V (Note 1) I_C = 250 mA, V_{CE} = 10V (Note 1) I_C = 500 mA, V_{CE} = 10V (Note 1)	30	110 120 60 25	300	
$V_{CE(SAT)}$	I_C = 100 mA, I_B = 10 mA (Note 1) I_C = 500 mA, I_B = 100 mA (Note 1)		0.2 0.3	0.5 0.7	V
$V_{BE(SAT)}$	I_C = 500 mA, I_B = 100 mA (Note 1)		0.9	1.2	V
$V_{BE(ON)}$	I_C = 100 mA, V_{CE} = 10V (Note 1)		0.7	1.0	V
f_t	I_C = 50 mA, V_{CE} = 10V	20	60		MHz
C_{ob}	V_{CB} = 10V, f = 1 MHz			15	pF
C_{ib}	V_{BE} = 0.5V, f = 1 MHz			125	pF
$P_{D(max)}$ TO-202 TO-226 TO-237 TO-39	 T_C = 25°C T_A = 25°C T_C = 25°C T_A = 25°C T_C = 25°C T_A = 25°C T_C = 25°C T_A = 25°C	 15 2 2 1 2 850 10 1			 W W W mW W

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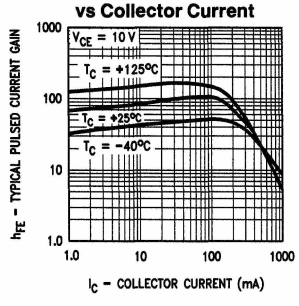
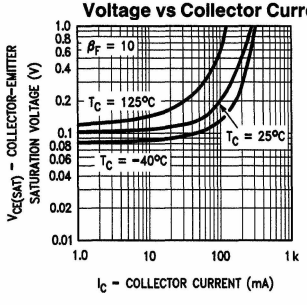
Symbol	Conditions	Min	Typ	Max	Units
θ_{JC}					
TO-202	$T_C = 25°C$			8.33	°C/W
TO-226	$T_C = 25°C$			62.5	°C/W
TO-237	$T_C = 25°C$			62.5	°C/W
TO-39	$T_C = 25°C$			17.5	°C/W
θ_{JA}					
TO-202	$T_A = 25°C$			62.5	°C/W
TO-226	$T_A = 25°C$			125	°C/W
TO-237	$T_A = 25°C$			147	°C/W
TO-39	$T_A = 25°C$			175	°C/W
$T_{J(max)}$					
	All Plastic Parts	150			°C
	TO-39	200			°C

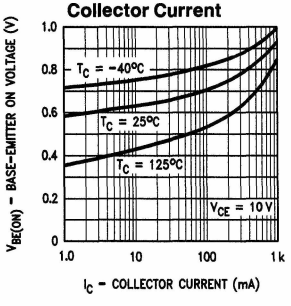
Typical Current Gain vs Collector Current



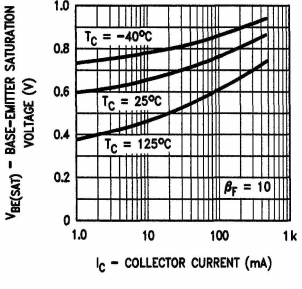
Collector-Emitter Saturation Voltage vs Collector Current



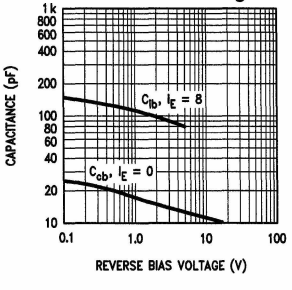
Base-Emitter ON Voltage vs Collector Current



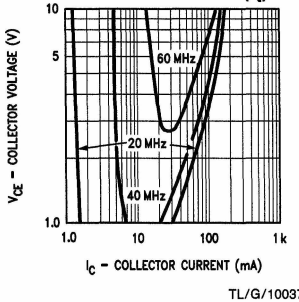
Base-Emitter Saturation Voltage vs Collector Current



Collector-Base and Emitter-Base Capacitance vs Reverse Bias Voltage



Contours of Constant Gain Bandwidth Product (f_t)



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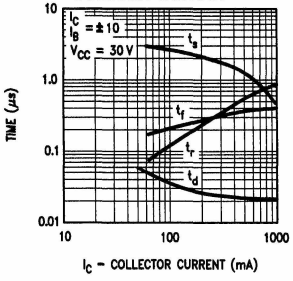
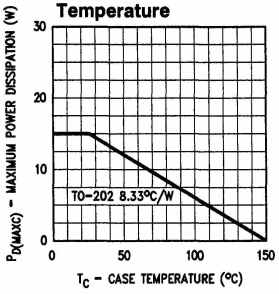
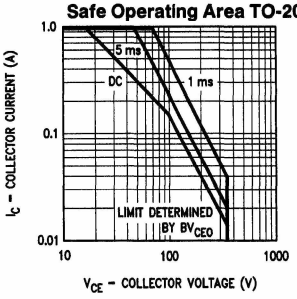
Typical Switching Time vs Collector Current



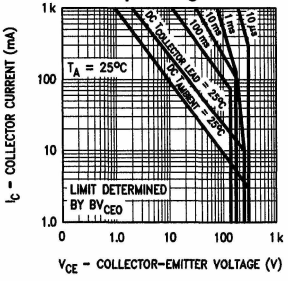
Maximumn Power Dissipation vs Case Temperature



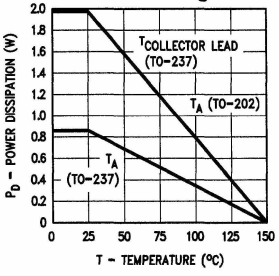
Safe Operating Area TO-202



Safe Operating Area TO-237



Thermal Derating Curve



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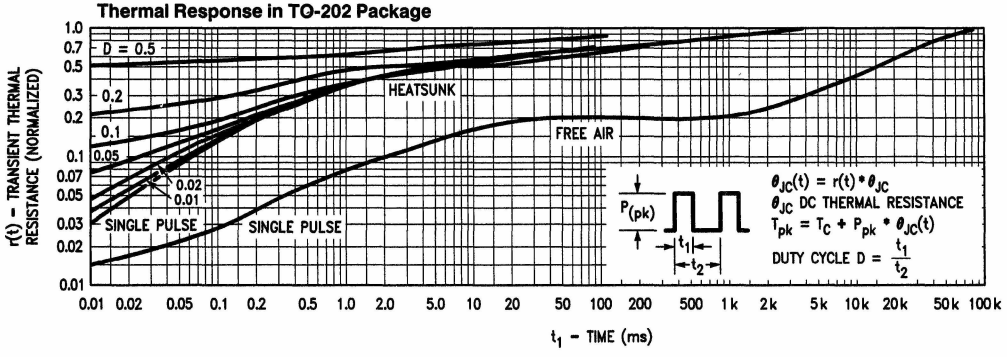
Thermal Response in TO-202 Package



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