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2N3644 • 2N3645 • PN3644 • PN3645

PNP SMALL SIGNAL GENERAL PURPOSE AMPLIFIERS AND SWITCHES

ABSOLUTE MAXIMUM RATINGS

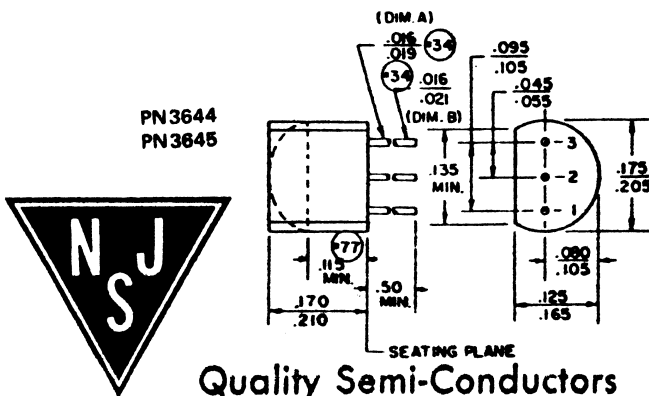
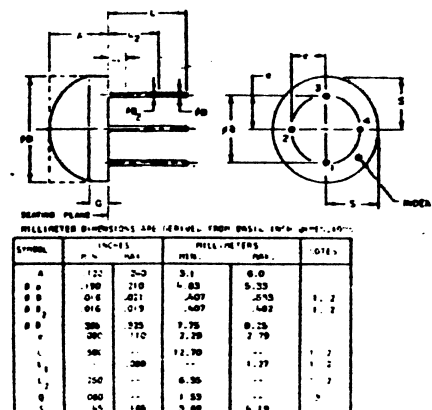
		2N3644/45	PN3644/45
Maximum Temperatures			
Storage Temperature		-55°C to +125°C	-55°C to +150°C
Operating Junction Temperature		125°C	150°C
Lead Temperature (10 seconds)		260°C	260°C
Maximum Power Dissipation (Notes 2 & 3)			
Total Dissipation at 25°C Case Temperature		0.07 W	1.0 W
at 25°C Ambient Temperature		0.3 W	0.625 W
Maximum Voltages and Current		2N/PN3645	2N/PN3644
VCBO Collector to Base Voltage		-60 V	-45 V
VCEO Collector to Emitter Voltage (Note 4)		-60 V	-45 V
VEBO Emitter to Base Voltage		-5.0 V	-5.0 V
IC Collector Current		500 mA	500 mA

ELECTRICAL CHARACTERISTICS (25°C Ambient Temperature unless otherwise noted)

SYMBOL	CHARACTERISTIC	2N3644 PN3644		2N3645 PN3645		UNITS	TEST CONDITIONS
		MIN.	MAX.	MIN.	MAX.		
h _{FE}	DC Current Gain	40		40			I _C = 100 μA, V _{CE} = -10 V
		80		80			I _C = 1.0 mA, V _{CE} = -10 V
h _{FE}	DC Pulse Current Gain	100		100			I _C = 10 mA, V _{CE} = -10 V
		80	240	80	240		I _C = 50 mA, V _{CE} = 1.0 V
		100	300	100	300		I _C = 150 mA, V _{CE} = -10 V
		20		20			I _C = 300 mA, V _{CE} = -2.0 V
h _{fe}	High Frequency Current Gain	2.0		2.0			I _C = 20 mA, V _{CE} = -20 V, f = 100 MHz
C _{ob}	Output Capacitance		8.0		8.0	pF	I _E = 0, V _{CB} = -10 V, f = 140 kHz
C _{ib}	Input Capacitance		35		35	pF	I _C = 0, V _{EB} = -0.5 V, f = 140 kHz
V _{CE(sat)}	Pulsed Collector Saturation Voltage		-0.25		-0.25	V	I _C = 50 mA, I _B = 2.5 mA
			-0.4		-0.4	V	I _C = 150 mA, I _B = 15 mA
			-1.0		-1.0	V	I _C = 300 mA, I _B = 30 mA
V _{CEO(sus)}	Collector to Emitter Sustaining Voltage	-45		-60		V	I _C = 10 mA (pulsed), I _B = 0
V _{BE(sat)}	Pulsed Base		-1.0		-1.0	V	I _C = 50 mA, I _B = 2.5 mA
			-1.3		-1.3	V	I _C = 150 mA, I _B = 15 mA
			-2.0	-0.8	-2.0	V	I _C = 300 mA, I _B = 30 mA
BV _{EB0}	Emitter to Base Breakdown Voltage	-0.8				V	I _C = 0, I _E = 10 μA
BV _{CB0}	Collector to Base Breakdown Voltage	-45		-60		V	I _C = 100 μA, I _E = 0
t _{on}	Turn On Time		40		40	ns	I _C ≈ 300 mA, I _{B1} ≈ 30 mA, V _{CC} = -30 V
t _{off}	Turn Off Time		100		100	ns	I _C ≈ 300 mA, I _{B1} ≈ I _{B2} ≈ 30 mA, V _{CE} = -30 V
I _{CES}	Collector Reverse Current		35		35	nA	V _{CE} = -30 V, V _{BE} = 0
			2.0		2.0	μA	V _{CE} = -50 V, V _{BE} = 0
						μA	V _{CE} = -30 V, V _{BE} = 0, T _A = 65°C
						μA	V _{CE} = -50 V, V _{BE} = 0, T _A = 65°C

TO-92

TO-105



2N3639 • 2N3640 • MPS3639 • MPS3640

ELECTRICAL CHARACTERISTICS (25°C Ambient Temperature unless otherwise noted) (Cont'd)

SYMBOL	CHARACTERISTIC	2N3639		2N3640		UNITS	TEST CONDITIONS
		MIN.	MAX.	MIN.	MAX.		
C_{ob}	Output Capacitance		3.5		3.5	pF	$I_E = 0, V_{CB} = -5.0 \text{ V}, f = 140 \text{ kHz}$
C_{ib}	Input Capacitance		5.5		5.5	pF	$I_E = 0, V_{CB} = 0, f = 140 \text{ kHz}$
BV_{CBO}	Collector to Base Breakdown Voltage	-6.0	3.5	-12	3.5	pF	$I_C = 0, V_{EB} = -0.5 \text{ V}, f = 140 \text{ kHz}$
BV_{CES}	Collector to Emitter Breakdown Voltage	-6.0		-12		V	$I_C = 100 \mu\text{A}, I_E = 0$
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Note 4)	-6.0		-12		V	$I_C = 100 \mu\text{A}, V_{BE} = 0$
$BVEBO$	Emitter to Base Breakdown Voltage	-4.0		-4.0		V	$I_C = 10 \text{ mA}, I_B = 0$
						V	$I_E = 100 \mu\text{A}, I_C = 0$

SYMBOL	CHARACTERISTIC	MPS3639		MPS3640		UNITS	TEST CONDITIONS
		MIN.	MAX.	MIN.	MAX.		
t_{on}	Turn on Time (see test circuit no. 235)		25		25	ns	$I_C \approx 50 \text{ mA}, I_{B1} \approx 5.0 \text{ mA}, V_{CC} = 6.0 \text{ V}$
	(see test circuit no. 219)		60		60	ns	$I_C \approx 10 \text{ mA}, I_{B1} \approx 0.5 \text{ mA}, V_{CC} = -1.5 \text{ V}$
t_{off}	Turn Off Time (see test circuit no. 235)		25		35	ns	$I_C \approx 50 \text{ mA}, I_{B1} \approx I_{B2} \approx 5.0 \text{ mA}, V_{CC} = -6.0 \text{ V}$
	(see test circuit no. 219)		60		75	ns	$I_C \approx 10 \text{ mA}, I_{B1} \approx I_{B2} \approx 0.5 \text{ mA}, V_{CC} = 1.5 \text{ V}$
h_{fe}	High Frequency Current Gain	3.0		5.0			$I_C = 10 \text{ mA}, V_{CB} = 0, f = 100 \text{ MHz}$
		5.0					$I_C = 10 \text{ mA}, V_{CE} = -5.0 \text{ V}, f = 100 \text{ MHz}$
h_{FE}	DC Pulse Current Gain (Note 4)	30	120	30	120		$I_C = 10 \text{ mA}, V_{CE} = -0.3 \text{ V}$
		20		20			$I_C = 50 \text{ mA}, V_{CE} = -1.0 \text{ V}$
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage (Note 4)		-0.16		-0.2	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
			-0.5		-0.6	V	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$
			-0.23		-0.25	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}, T_A = 65^\circ\text{C}$
$V_{BE(sat)}$	Base Saturation Voltage (Note 4)	-0.75	-0.95	-0.75	-0.95	V	$I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$
		-0.8	-1.0	-0.8	-1.0	V	$I_C = 10 \text{ mA}, I_B = 1.0 \text{ mA}$
			1.5		1.5	V	$I_C = 50 \text{ mA}, I_B = 5.0 \text{ mA}$
I_{CES}	Collector Reverse Current		10		10	nA	$V_{CE} = -3.0 \text{ V}, V_{BE} = 0$
			1.0		1.0	nA	$V_{CE} = -6.0 \text{ V}, V_{BE} = 0$
						μA	$V_{CE} = -3.0 \text{ V}, V_{BE} = 0, T_A = 65^\circ\text{C}$
						μA	$V_{CE} = -6.0 \text{ V}, V_{BE} = 0, T_A = 65^\circ\text{C}$
C_{ob}	Output Capacitance		3.5		3.5	pF	$I_E = 0, V_{CB} = -5.0 \text{ V}, f = 140 \text{ kHz}$
C_{ib}	Input Capacitance		3.5		3.5	pF	$I_C = 0, V_{EB} = -0.5 \text{ V}, f = 140 \text{ kHz}$
BV_{CBO}	Collector to Base Breakdown Voltage	-6.0		-12		V	$I_C = 100 \mu\text{A}, I_E = 0$
BV_{CES}	Collector to Emitter Breakdown Voltage	-6.0		-12		V	$I_C = 100 \mu\text{A}, V_{BE} = 0$
$V_{CEO(sus)}$	Collector to Emitter Sustaining Voltage (Note 4)	-6.0		-12		V	$I_C = 10 \text{ mA}, I_B = 0$
$BVEBO$	Emitter to Base Breakdown Voltage	-4.0		-4.0		V	$I_E = 100 \mu\text{A}, I_C = 0$