2N4400TF Datasheet

https://www.DiGi-Electronics.com

DiGi Electronics Part Number	2N4400TF-DG
Manufacturer	onsemi
Manufacturer Product Number	2N4400TF
Description	TRANS NPN 40V 0.6A TO92-3
Detailed Description	Bipolar (BJT) Transistor NPN 40 V 600 mA 625 mW Through Hole TO-92-3

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

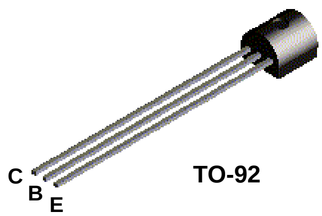
Manufacturer Product Number:	Manufacturer:
2N4400TF	onsemi
Series:	Product Status:
-	Obsolete
Transistor Type:	Current - Collector (Ic) (Max):
NPN	600 mA
Voltage - Collector Emitter Breakdown (Max):	Vce Saturation (Max) @ Ib, Ic:
40 V	750mV @ 50mA, 500mA
Current - Collector Cutoff (Max):	DC Current Gain (hFE) (Min) @ Ic, Vce:
-	50 @ 150mA, 1V
Power - Max:	Frequency - Transition:
625 mW	-
Operating Temperature:	Mounting Type:
-55°C ~ 150°C (TJ)	Through Hole
Package / Case:	Supplier Device Package:
TO-226-3, TO-92-3 (TO-226AA) Formed Leads	TO-92-3
Base Product Number:	
2N4400	

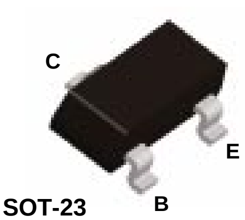
Environmental & Export classification

Moisture Sensitivity Level (MSL):	REACH Status:
1 (Unlimited)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8541.21.0095

FAIRCHILD
SEMICONDUCTOR TM

2N4400 MMBT4400





NPN General Purpose Amplifier

This device is designed for use as general purpose amplifiers and switches requiring collector currents to 500 mA.

Absolute Maximum Ratings*

TA = 25°C unless otherwise noted

Symbol	Parameter	Value	Units
V_{CEO}	Collector-Emitter Voltage	40	V
V_{CBO}	Collector-Base Voltage	60	V
V_{EBO}	Emitter-Base Voltage	6.0	V
I_C	Collector Current - Continuous	600	mA
T_J, T_{stg}	Operating and Storage Junction Temperature Range	-55 to +150	°C

*These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

NOTES:
1) These ratings are based on a maximum junction temperature of 150 degrees C.
2) These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

Thermal Characteristics

TA = 25°C unless otherwise noted

Symbol	Characteristic	Max		Units
		2N4400	*MMBT4400	
P_D	Total Device Dissipation Derate above 25°C	625 5.0	350 2.8	mW mW/°C
$R_{\theta JC}$	Thermal Resistance, Junction to Case	83.3		°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	200	357	°C/W

NPN General Purpose Amplifier
(continued)

Electrical Characteristics
TA = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Max	Units
OFF CHARACTERISTICS					
$V_{(BR)CEO}$	Collector-Emitter Breakdown Voltage*	I_C = 1.0 mA, I_B = 0	40		V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage	I_C = 100 μA, I_E = 0	60		V
$V_{(BR)EBO}$	Emitter-Base Breakdown Voltage	I_E = 100 μA, I_C = 0	6.0		V
I_{CEX}	Collector Cutoff Current	V_{CE} = 35 V, V_{EB} = 0.4 V		0.1	μA
I_{BL}	Emitter Cutoff Current	V_{CE} = 35 V, V_{EB} = 0.4 V		0.1	μA
ON CHARACTERISTICS*					
h_{FE}	DC Current Gain	V_{CE} = 1.0 V, I_C = 1.0 mA V_{CE} = 1.0 V, I_C = 10 mA V_{CE} = 1.0 V, I_C = 150 mA V_{CE} = 2.0 V, I_C = 500 mA	20 40 50 20	 150 	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	I_C = 150 mA, I_B =15 mA I_C = 500 mA, I_B = 50 mA		0.40 0.75	V V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	I_C = 150 mA, I_B =15 mA I_C = 500 mA, I_B = 50 mA	0.75	0.95 1.2	V V
SMALL SIGNAL CHARACTERISTICS					
C_{ob}	Output Capacitance	V_{CB} = 5.0 V, f = 140 kHz		6.5	pF
C_{ib}	Input Capacitance	V_{EB} = 0.5 V, f = 140 kHz		30	pF
h_{fe}	Small-Signal Current Gain	I_C = 20 mA, V_{CE} = 10 V, f = 100 MHz	2.0		
h_{fe}	Small-Signal Current Gain	V_{CE} = 10 V, I_C = 1.0 mA,	20	250	
h_{ie}	Input Impedance	f = 1.0 kHz	0.5	7.5	KΩ
h_{re}	Voltage Feedback Ratio		0.1	8.0	x 10^{-4}
h_{oe}	Output Admittance		1.0	30	μmhos
SWITCHING CHARACTERISTICS					
t_d	Delay Time	V_{CC} = 30 V, I_C = 150 mA,		15	ns
t_r	Rise Time	I_{B1} = 15 mA ,V_{EB} = 2 V		20	ns
t_s	Storage Time	V_{CC} = 30 V, I_C = 150 mA		225	ns
t_f	Fall Time	I_{B1} = I_{B2} = 15 mA		30	ns

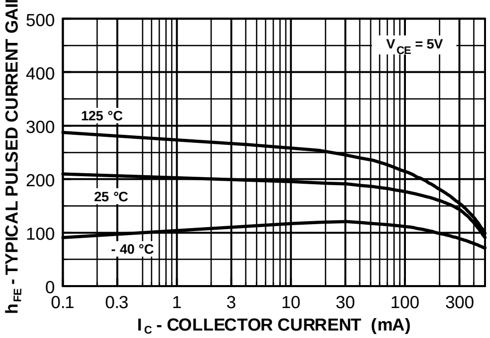
*Pulse Test: Pulse Width £ 300 ms, Duty Cycle £ 2.0%

NPN General Purpose Amplifier

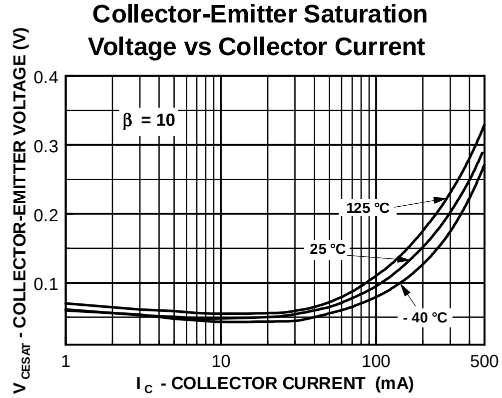
(continued)

Typical Characteristics

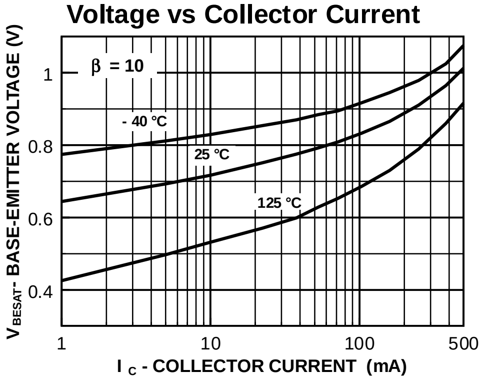
Typical Pulsed Current Gain vs Collector Current



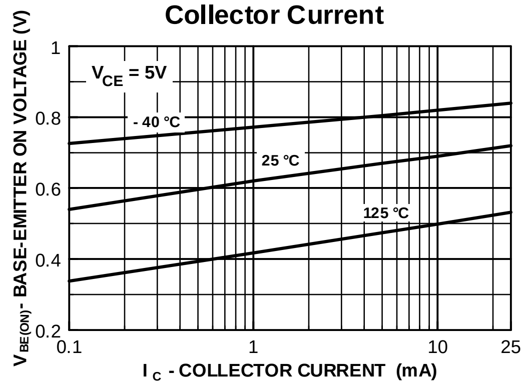
Collector-Emitter Saturation Voltage vs Collector Current



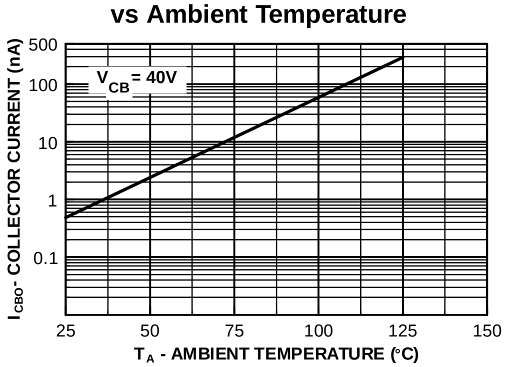
Base-Emitter Saturation Voltage vs Collector Current



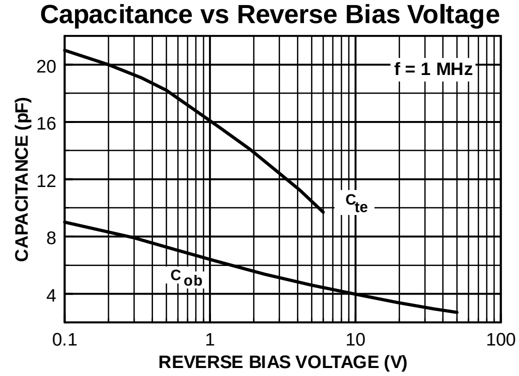
Base-Emitter ON Voltage vs Collector Current



Collector-Cutoff Current vs Ambient Temperature



Emitter Transition and Output Capacitance vs Reverse Bias Voltage



NPN General Purpose Amplifier

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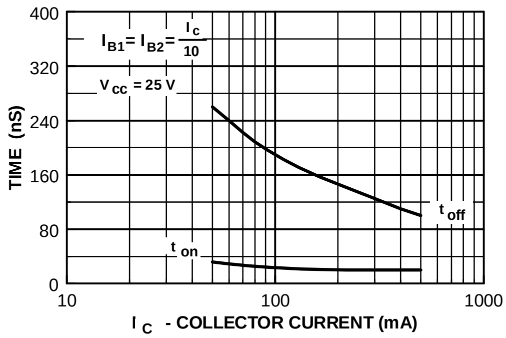
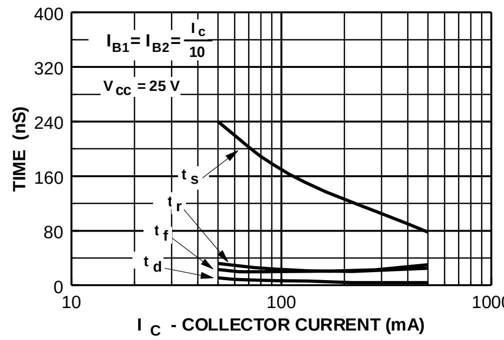
Typical Characteristics (continued)

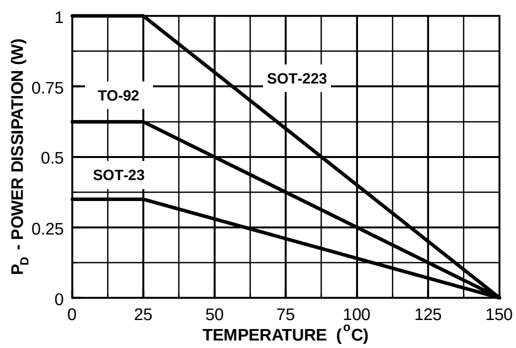
Turn On and Turn Off Times vs Collector Current



Switching Times vs Collector Current

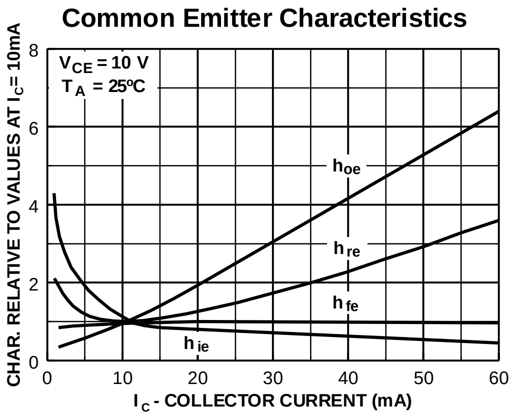


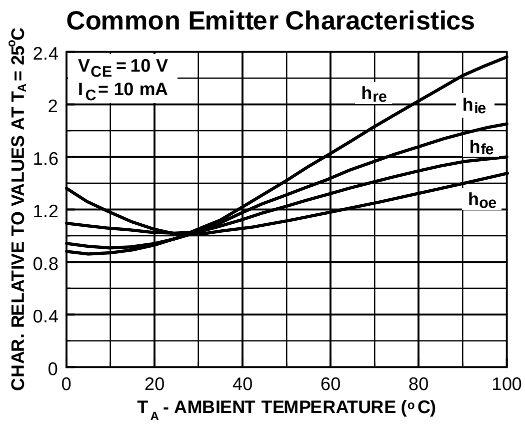
Power Dissipation vs Ambient Temperature

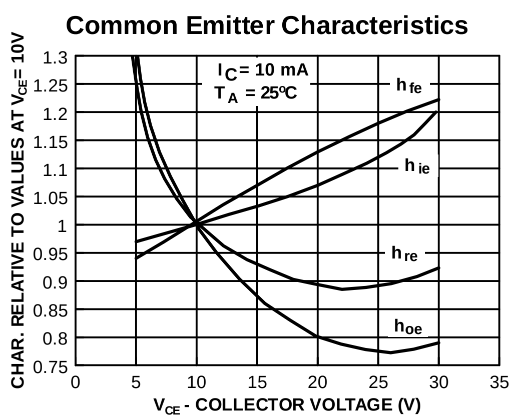


NPN General Purpose Amplifier
(continued)

Typical Common Emitter Characteristics (f = 1.0kHz)







NPN General Purpose Amplifier
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Test Circuits

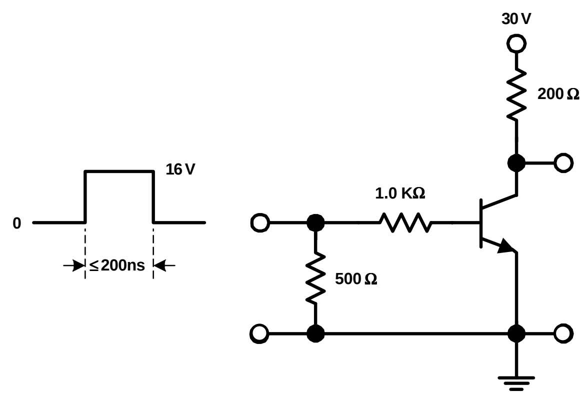

FIGURE 1: Saturated Turn-On Switching Timer

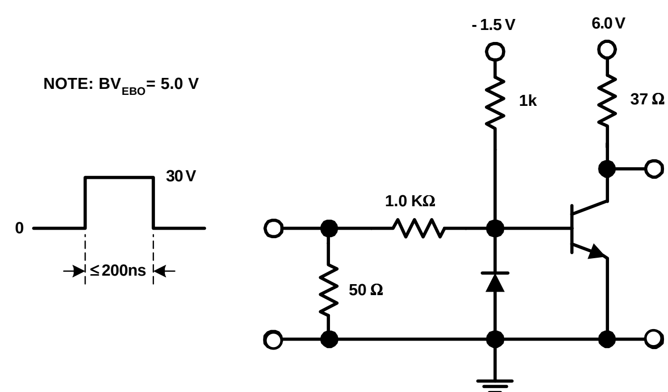

FIGURE 2: Saturated Turn-Off Switching Time

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FACT™	OPTOPLANAR™	SuperSOT™-3	
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FAST®	POP™	SuperSOT™-8	

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