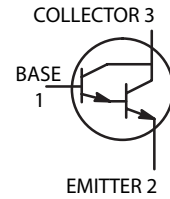


NPN Transistors Darlington Amplifier

* We declare that the material of product compliance with RoHS requirements.

(Pb) Lead(Pb)-Free



MAXIMUM RATINGS

Rating	Symbol	V alue	Unit
Collector–Emitter Voltage	V_{CEO}	40	Vdc
Collector–Base Voltage	V_{CBO}	40	Vdc
Emitter–Base Voltage	V_{EBO}	12	Vdc
Collector Current — Continuous	I_C	500	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR– 5 Board, (1) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	225 1.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	556	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (2) $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	300 2.4	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	417	$^\circ\text{C/W}$
Junction and Storage Temperature	T_J, T_{stg}	–55 to +150	$^\circ\text{C}$

DEVICE MARKING

MMBT6427 = 1V

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

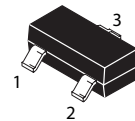
Characteristic	Symbol	Min	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage(3) ($I_C = 10\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CEO}$	40	—	V
Collector–Base Breakdown Voltage ($I_C = 100\text{ }\mu\text{Adc}$, $I_E = 0$)	$V_{(BR)CBO}$	40	—	V
Emitter–Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{Adc}$, $I_C = 0$)	$V_{(BR)EBO}$	12	—	V
Collector Cutoff Current ($V_{CE} = 25\text{ Vdc}$, $I_B = 0$)	I_{CES}	—	1.0	μA
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	50	nA
Emitter Cutoff Current ($V_{EB} = 10\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	50	nA

1. FR–5 = 1.0 x 0.75 x 0.062 in.

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



SOT-23

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

Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain ($I_C = 10\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 100\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$) ($I_C = 500\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	10,000 20,000 14,000	100,000 200,000 140,000	—
Collector-Emitter Saturation Voltage ($I_C = 50\text{ mAdc}$, $I_B = 0.5\text{ mAdc}$) ($I_C = 500\text{ mAdc}$, $I_B = 0.5\text{ mAdc}$)	$V_{CE(sat)}(3)$	— —	1.2 1.5	V
Base-Emitter Saturation Voltage ($I_C = 500\text{ mAdc}$, $I_B = 0.5\text{ mAdc}$)	$V_{BE(sat)}$	—	2.0	V
Base-Emitter On Voltage ($I_C = 50\text{ mAdc}$, $V_{CE} = 5.0\text{ Vdc}$)	$V_{BE(on)}$	—	1.75	V
SMALL-SIGNAL CHARACTERISTICS				
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{obo}	—	7.0	pF
Input Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, $f = 1.0\text{ MHz}$)	C_{ibo}	—	15	pF
Current Gain-High Frequency ($V_{CE} = 5.0\text{ Vdc}$, $I_C = 10\text{ mAdc}$, $f = 100\text{ MHz}$)	$ h_{fe} $	1.3	—	V
Noise Finure ($V_{CE} = 5.0\text{ Vdc}$, $I_C = 1.0\text{ mAdc}$, $R_S = 100\text{ k}\Omega$, $f = 1.0\text{ kHz}$)	NF	—	10	dB

3. **Pulse Tent:** Pulse Width = 300 μs , Duty Cycle = 2.0%

NOISE CHARACTERISTICS

($V_{CE} = 5.0\text{ Vdc}$, $T_A = 25^\circ\text{C}$)

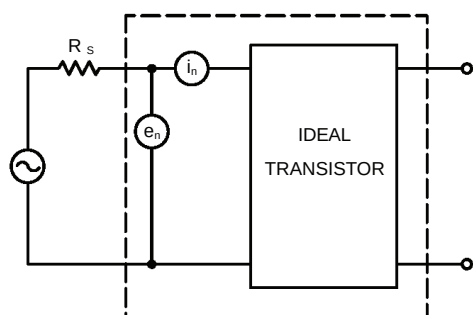


Figure 1. Transistor Noise Model

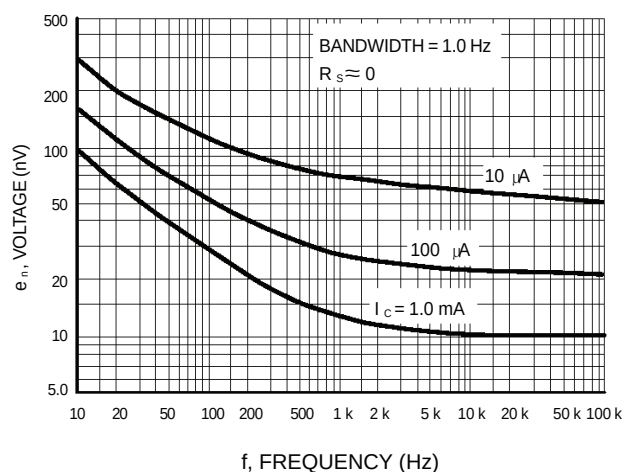
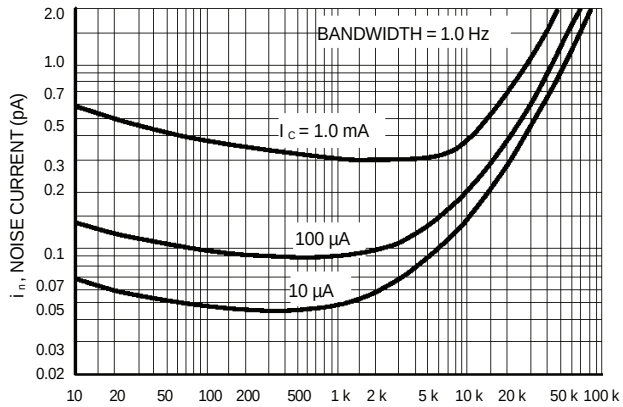


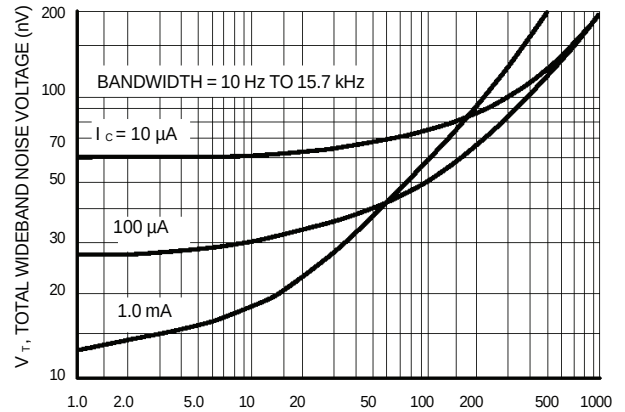
Figure 2. Noise Voltage

NOISE CHARACTERISTICS

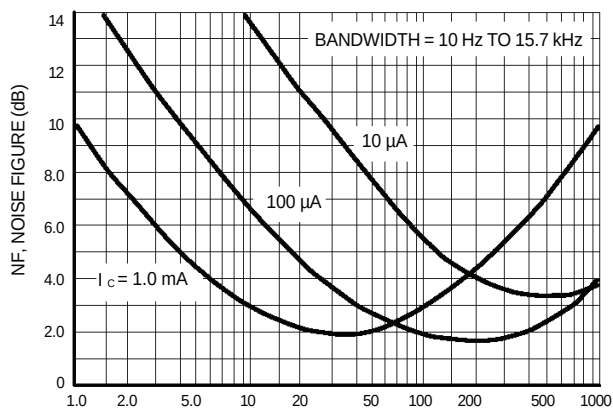
($V_{CE} = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)



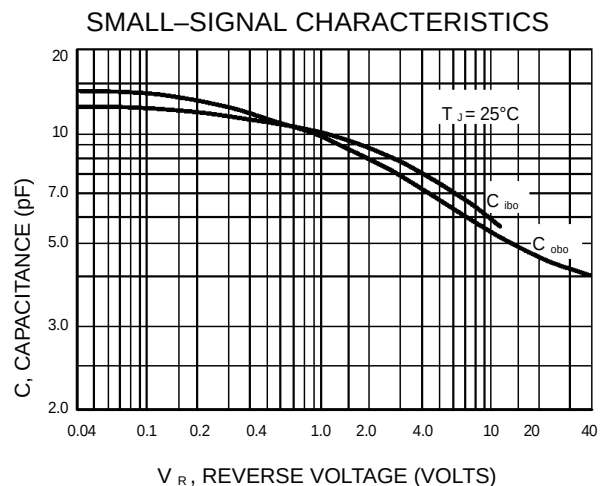
f, FREQUENCY (Hz)
Figure 3. Noise Current



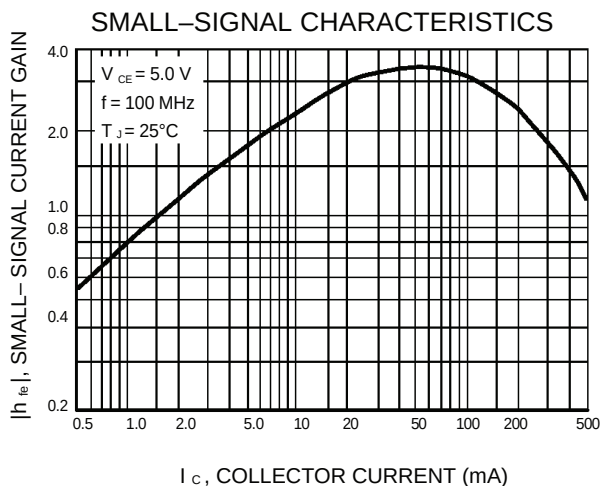
R_s , SOURCE RESISTANCE (kΩ)
Figure 4. Total Wideband Noise Voltage



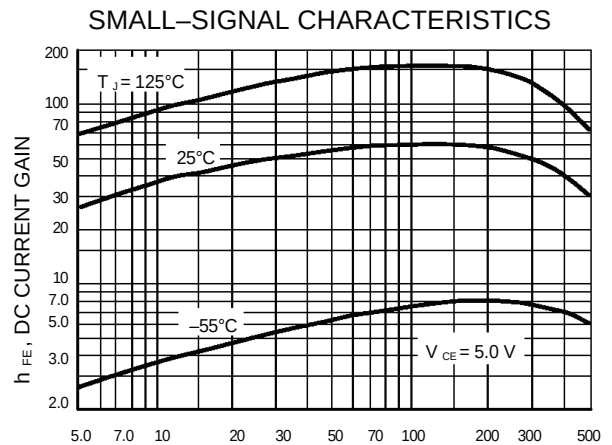
R_s , SOURCE RESISTANCE (kΩ)
Figure 5. Wideband Noise Figure



V_R , REVERSE VOLTAGE (VOLTS)
Figure 6. Capacitance



I_C , COLLECTOR CURRENT (mA)
Figure 7. High Frequency Current Gain



I_C , COLLECTOR CURRENT (mA)
Figure 8. DC Current Gain

SMALL-SIGNAL CHARACTERISTICS

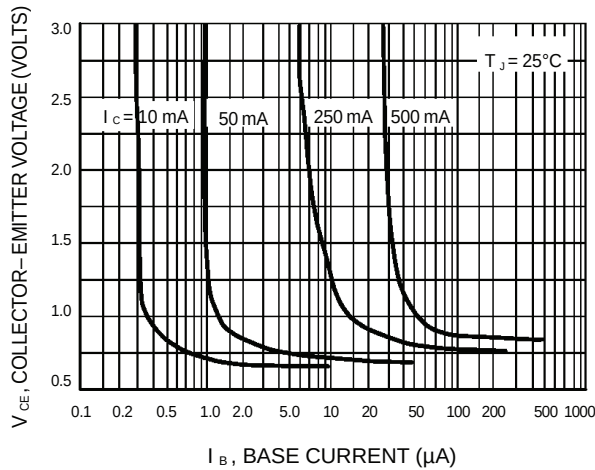


Figure 9. Collector Saturation Region

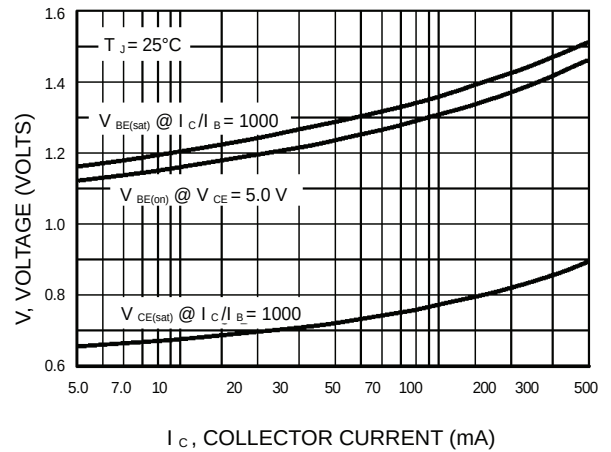


Figure 10. "On" Voltages

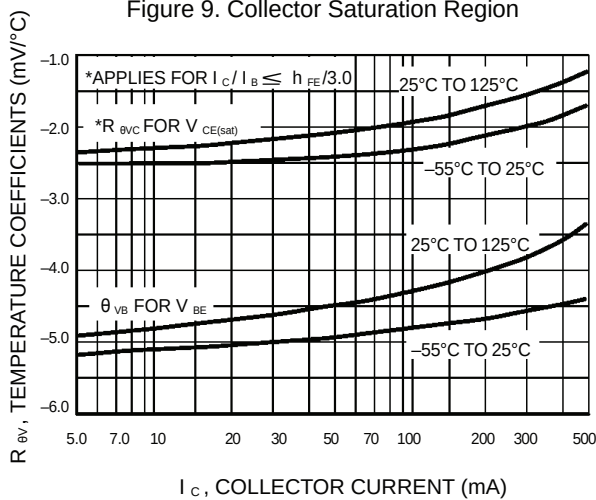
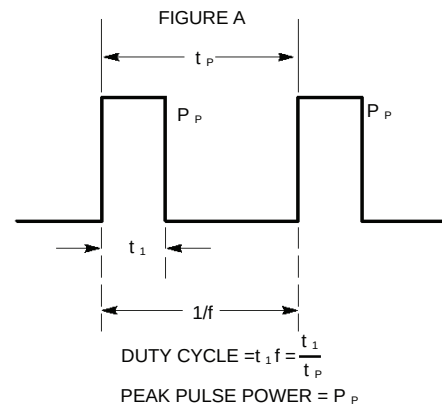


Figure 11. Temperature Coefficients



Design Note: Use of Transient Thermal Resistance Data

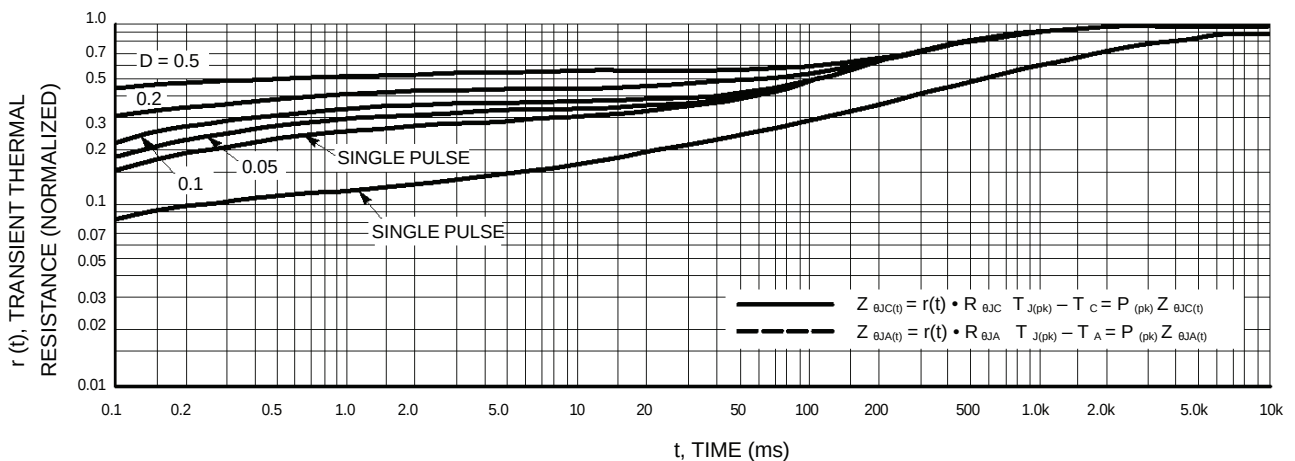
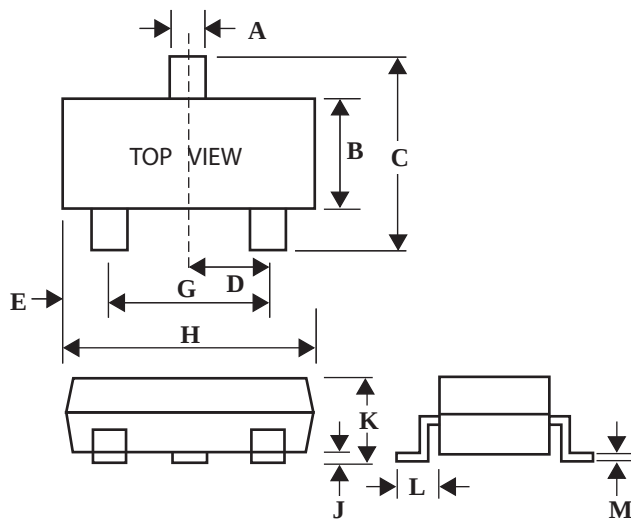


Figure 12. Thermal Response

SOT-23 Package Outline Dimensions

Unit:mm



Dim	Min	Max
A	0.35	0.51
B	1.19	1.80
C	2.10	3.00
D	0.85	1.05
E	0.46	1.00
G	1.70	2.10
H	2.70	3.10
J	0.01	0.13
K	0.89	1.60
L	0.30	0.61
M	0.076	0.25