

350mW, PNP Small Signal Transistor

FEATURES

- Low power loss, high efficiency
- Ideal for automated placement
- High surge current capability
- Moisture sensitivity level: level 1, per J-STD-020
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

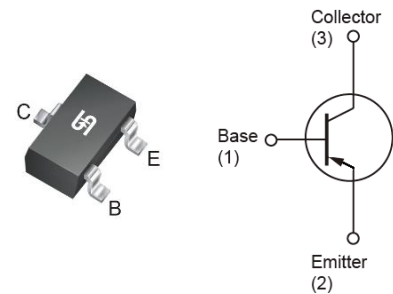
APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- Lighting application
- On-board DC/DC converter

MECHANICAL DATA

- Case: SOT-23
- Molding compound meets UL 94 V-0 flammability rating
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 1A whisker test
- Weight: 0.008g(approximately)

KEY PARAMETERS		
PARAMETER	VALUE	UNIT
V_{CBO}	-40	V
V_{CEO}	-40	V
V_{EBO}	-5	V
I_C	-200	mA
h_{FE}	300	
Package	SOT-23	
Configuration	Single die	



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	MMBT3906	UNIT
Marking code on the device		2A	
Collector-base voltage	V_{CBO}	-40	V
Collector-emitter voltage	V_{CEO}	-40	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current, dc	I_C	-200	mA
Power dissipation	P_D	350	mW
Junction temperature	T_J	-55 to +150	$^\circ\text{C}$
Storage temperature	T_{STG}	-55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	TYP	UNIT
Junction-to-ambient thermal resistance	$R_{\theta JA}$	357	°C/W

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

PARAMETER	CONDITIONS	SYMBOL	MIN	MAX	UNIT
Collector-base breakdown voltage	$I_C = -10\mu\text{A}, I_E = 0$	$V_{(BR)CBO}$	-40	-	V
Collector-emitter breakdown voltage	$I_C = -1\text{mA}, I_B = 0$	$V_{(BR)CEO}$	-40	-	V
Emitter-base breakdown voltage	$I_E = -10\mu\text{A}, I_C = 0$	$V_{(BR)EBO}$	-5	-	V
Collector base cutoff current	$V_{CB} = -40\text{V}$	I_{CBO}	-	-100	nA
Emitter base cutoff current	$V_{EB} = -5\text{V}$	I_{EBO}	-	-50	nA
DC current gain	$V_{CE} = -1\text{V}, I_C = -0.1\text{mA}$	h_{FE}	60	300	
	$V_{CE} = -1\text{V}, I_C = -1\text{mA}$		80		
	$V_{CE} = -1\text{V}, I_C = -10\text{mA}$		100		
	$V_{CE} = -1\text{V}, I_C = -50\text{mA}$		60		
	$V_{CE} = -1\text{V}, I_C = -100\text{mA}$		30		
Collector-emitter saturation voltage	$I_C = -10\text{mA}, I_B = -1\text{mA}$	$V_{CE(sat)}$	-	-0.25	V
	$I_C = -50\text{mA}, I_B = -5\text{mA}$		-	-0.4	
Base-emitter saturation voltage	$I_C = -10\text{mA}, I_B = -1\text{mA}$	$V_{BE(sat)}$	-0.65	-0.85	V
	$I_C = -50\text{mA}, I_B = -5\text{mA}$		-	-0.95	
Transition frequency	$V_{CE} = -20\text{V}, I_C = -10\text{mA}, f = 100\text{MHz}$	f_T	250	-	MHz
Output capacitance	$f = 1\text{MHz}, V_{CB} = -5\text{V}, I_E = 0$	C_{OBO}	-	4.5	pF
Delay time	$V_{CC} = -3\text{V}, V_{BE} = -0.5\text{V}, I_C = -10\text{mA}$	t_d	-	35	ns
Rise time	$I_{B1} = -1\text{mA}$	t_r	-	35	ns
Storage time	$V_{CC} = -3\text{V}, I_C = -10\text{mA}$	t_s	-	225	ns
Fall time	$I_{B1} = I_{B2} = -1\text{mA}$	t_f	-	75	ns

ORDERING INFORMATION

ORDERING CODE ⁽¹⁾	PACKAGE	PACKING
MMBT3906 RF	SOT-23	3,000 / 7" Reel
MMBT3906 RFG	SOT-23	3,000 / 7" Reel
MMBT3906 R5	SOT-23	10,000 / 13" Reel
MMBT3906 R5G	SOT-23	10,000 / 13" Reel

Notes:

- "G" means green compound (halogen free)

CHARACTERISTICS CURVES

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

Fig.1 Capacitance

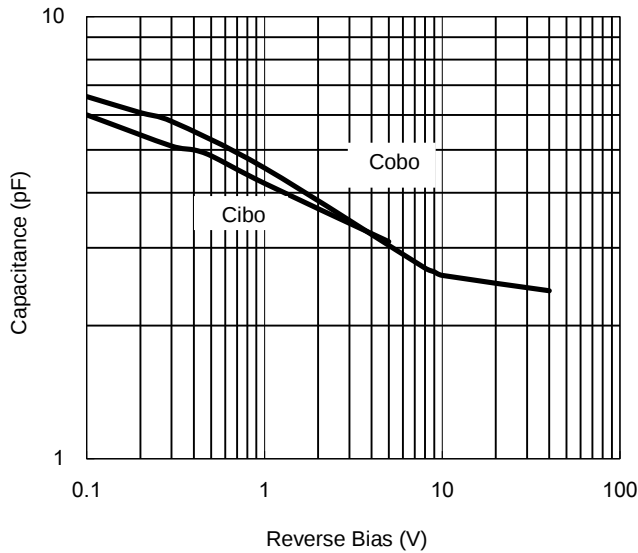


Fig.2 Charge Data

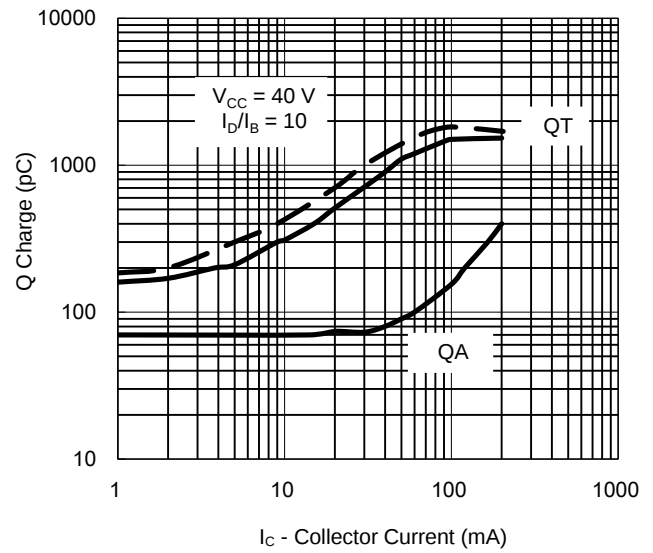


Fig.3 Turn - On Time

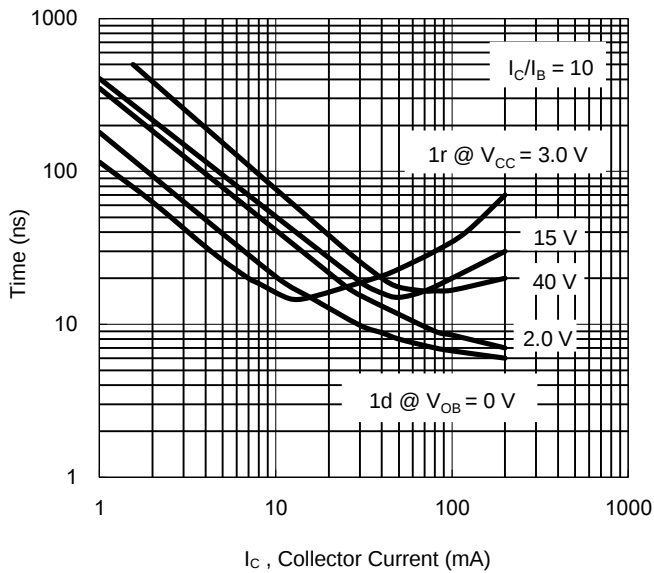
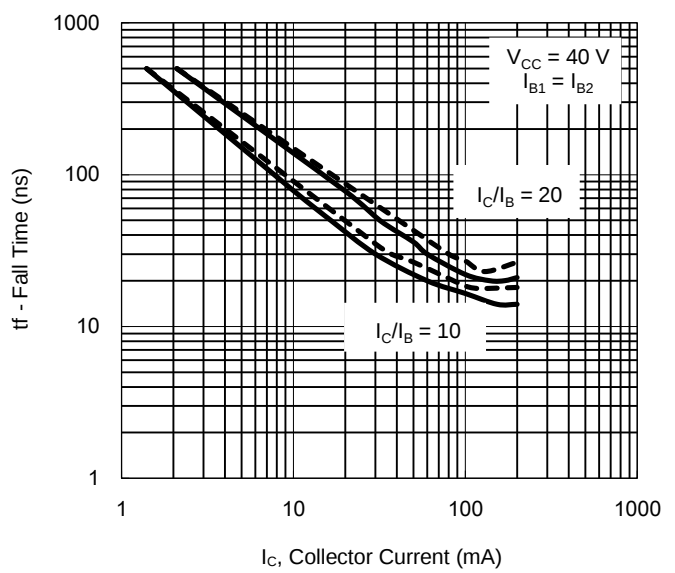


Fig.4 Fall Time



CHARACTERISTICS CURVES

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

Fig.5 Noise Figure VS. Frequency

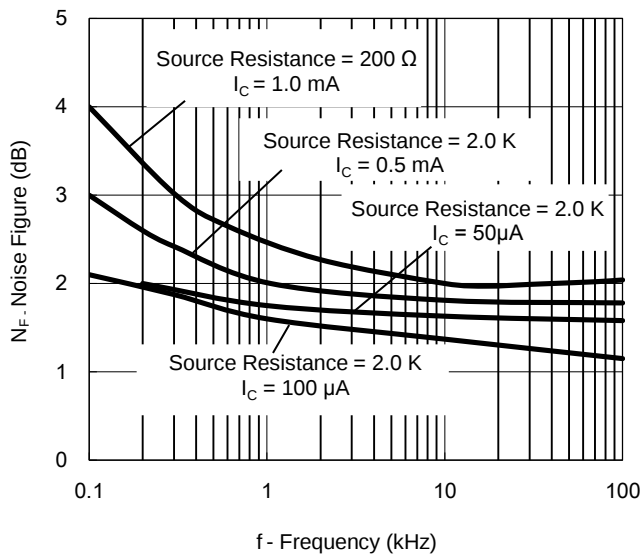


Fig.6 Noise Figure VS. Source Resistance

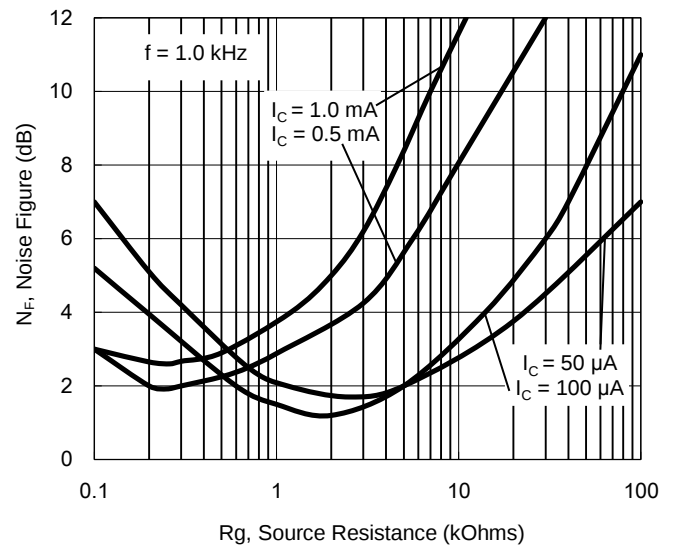


Fig.7 Current Gain

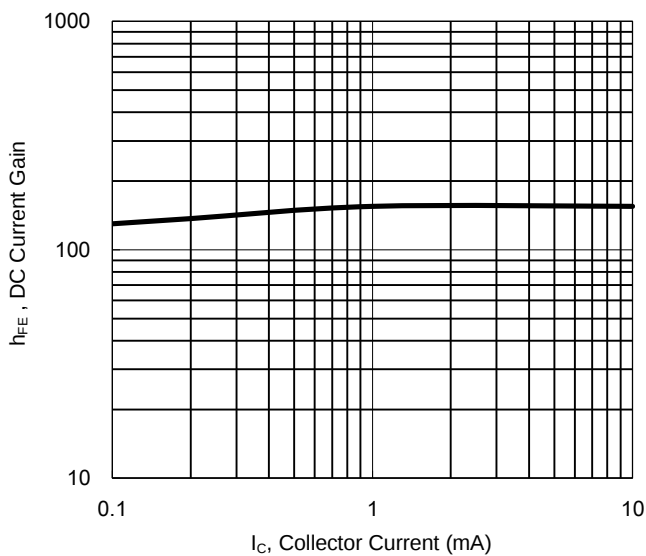
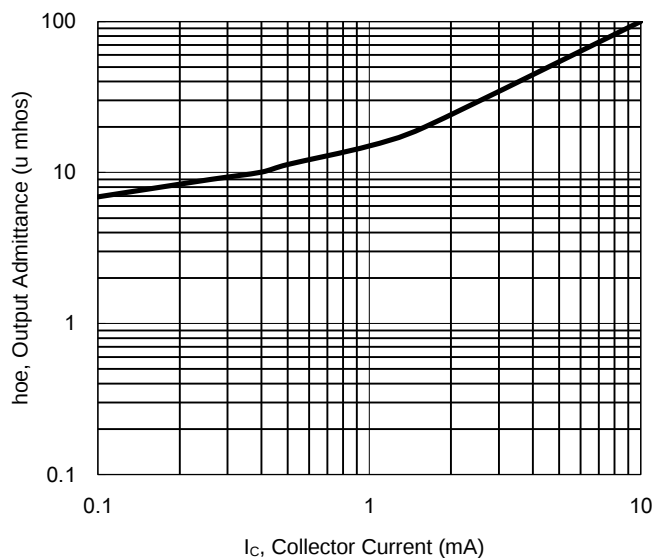


Fig.8 Output Admittance



CHARACTERISTICS CURVES

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

Fig.9 Input Impedance

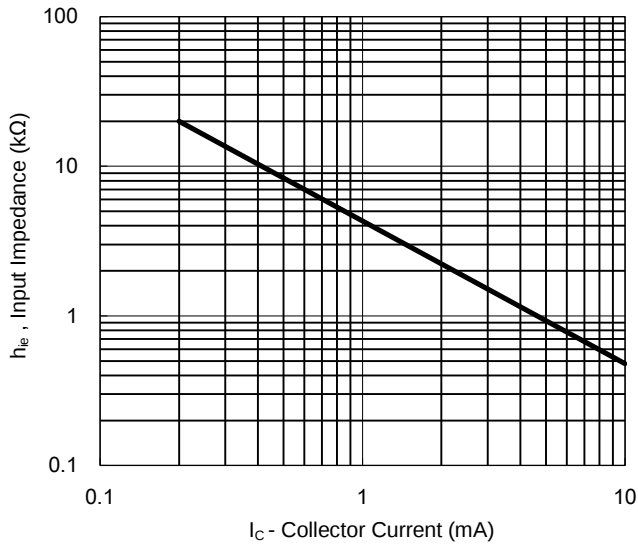


Fig.10 Voltage Feedback Ratio

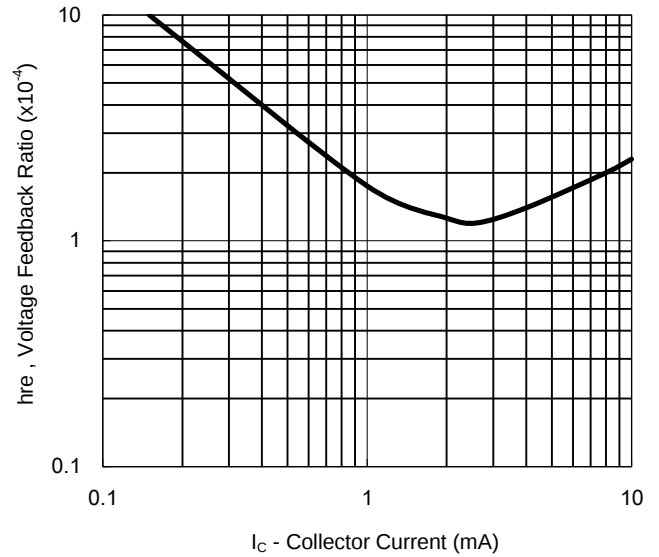


Fig.11 "ON" Voltages

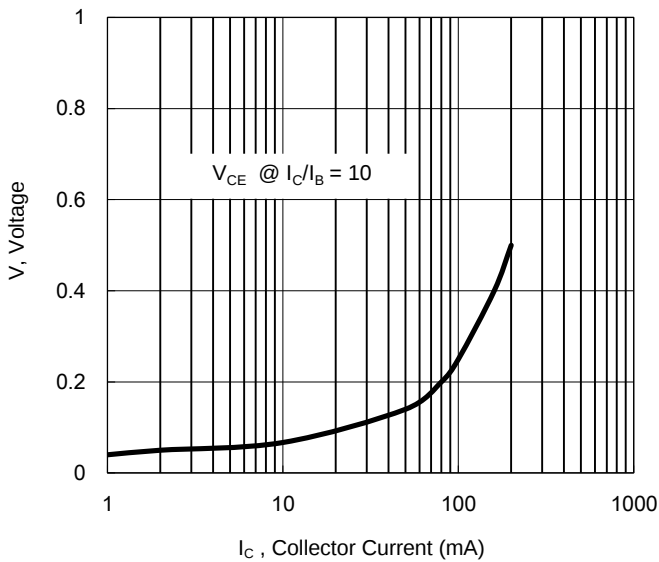
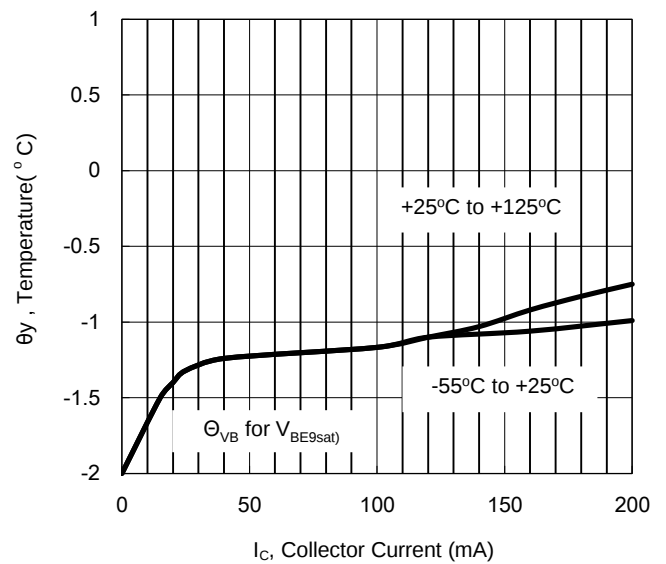
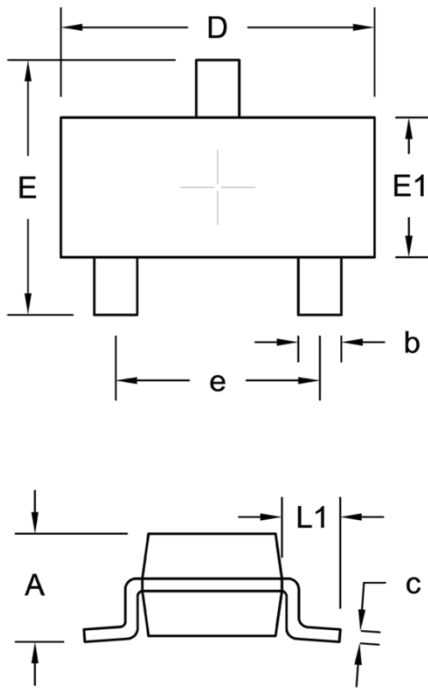


Fig.12 Temperature Coefficients



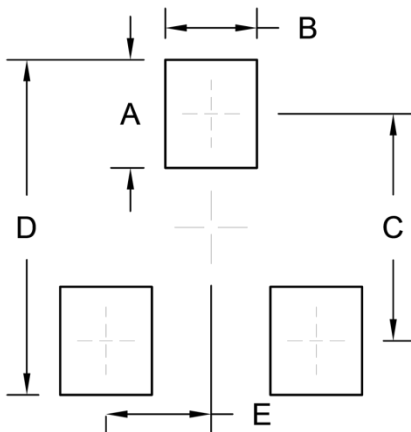
PACKAGE OUTLINE DIMENSION

SOT-23



DIM.	Unit (mm)		Unit (inch)	
	Min.	Max.	Min.	Max.
A	0.89	1.12	0.035	0.044
b	0.30	0.50	0.012	0.020
c	0.08	0.20	0.003	0.008
D	2.80	3.04	0.110	0.120
E	2.10	2.64	0.083	0.104
E1	1.20	1.40	0.047	0.055
e	1.90 BSC		0.075 BSC	
L1	0.54 REF.		0.021 REF.	

SUGGESTED PAD LAYOUT



Symbol	Unit (mm)	Unit (inch)
A	1.00	0.039
B	0.85	0.033
C	2.10	0.083
D	3.10	0.122
E	0.98	0.039

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