

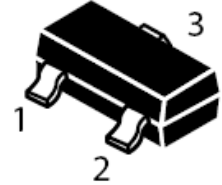
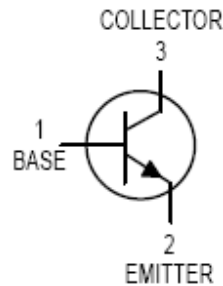
NPN General Purpose Transistor

FEATURES

- Ideal for Medium Power Amplification and Switching
- Complementary PNP Type available(MMST4403)

MECHANICAL DATA

- Case: SOT-323 Plastic
- Case material: "Green" molding compound, UL flammability classification 94V-0, (No Br. Sb. Cl)
- Lead Free in RoHS 2002/95/EC Compliant



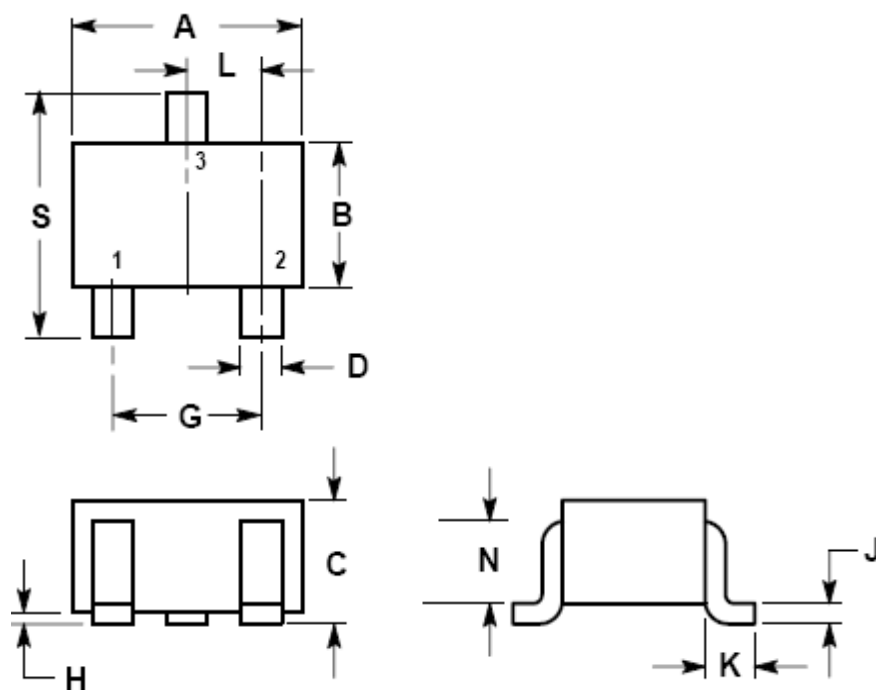
Maximum Ratings @ $T_A = 25^\circ\text{C}$

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	40	V
Emitter-Base Voltage	V_{EBO}	6	V
Collector Current -Continuous	I_C	600	mA
Total Power Dissipation FR-4 board	P_D	150	mW
Junction Temperature	T_J	150	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	-55~+150	$^\circ\text{C}$

Electrical Characteristics @ $T_A = 25^\circ\text{C}$ unless otherwise specified

Characteristic	Test Condition	Symbol	Min.	Typ.	Max.	Unit
Collector-base breakdown voltage	$I_C=100\mu\text{A}, I_E=0$	V_{CBO}	60			V
Collector-emitter breakdown voltage	$I_C=1\text{mA}, I_B=0$	V_{CEO}	40			V
Emitter-base breakdown voltage	$I_E=100\mu\text{A}, I_C=0$	V_{EBO}	6			V
Collector-emitter cut-off current	$V_{CE}=35\text{V}, V_{BE(off)}=0.4\text{V}$	I_{CEX}			0.1	μA
DC current gain	$V_{CE}=1\text{V}, I_C=0.1\text{mA}$	h_{FE1}	20			
	$V_{CE}=1\text{V}, I_C=1\text{mA}$	h_{FE2}	40			
	$V_{CE}=1\text{V}, I_C=10\text{mA}$	h_{FE3}	80			
	$V_{CE}=1\text{V}, I_C=150\text{mA}$	h_{FE4}	100		300	
	$V_{CE}=2\text{V}, I_C=500\text{mA}$	h_{FE5}	40			
Collector-emitter saturation voltage	$I_C=150\text{mA}, I_B=15\text{mA}$	$V_{CE(sat)1}$			0.4	V
	$I_C=500\text{mA}, I_B=50\text{mA}$	$V_{CE(sat)2}$			0.75	V
Base-emitter saturation voltage	$I_C=150\text{mA}, I_B=15\text{mA}$	$V_{BE(sat)1}$	0.75		0.95	V
	$I_C=500\text{mA}, I_B=50\text{mA}$	$V_{BE(sat)2}$			1.20	V
Transition frequency	$V_{CE}=10\text{V}, I_C=20\text{mA}, f=100\text{MHz}$	f_T	250			MHz
Output Capacitance	$V_{CB}=5\text{V}, I_E=0, f=1\text{MHz}$	C_{ob}			6.5	pF
Delay time	$V_{CC}=30\text{V}, V_{BE(off)}=2\text{V}, I_C=150\text{mA}, I_{B1}=15\text{mA}$	T_d			15	nS
Rise time		T_r			20	nS
Storage time	$V_{CC}=30\text{V}, I_C=150\text{mA}, I_{B1}=-I_{B2}=15\text{mA}$	T_s			225	nS
Fall time		T_f			30	nS

SOT-323 Outline Dimension



Symbol	Dimension In Millimeters	
	Min	Max.
A	1.80	2.20
B	1.15	1.35
C	0.80	1.00
D	0.30	0.40
G	1.20	1.40
H	0.00	0.10
J	0.10	0.25
K	0.425 REF	
L	0.650 BSC	
N	0.700 REF	
S	2.00	2.40

Device Marking:

Device P/N	Marking code
MMST4401	2X

Electrical characteristic curves

Fig.1 Turn-On Time

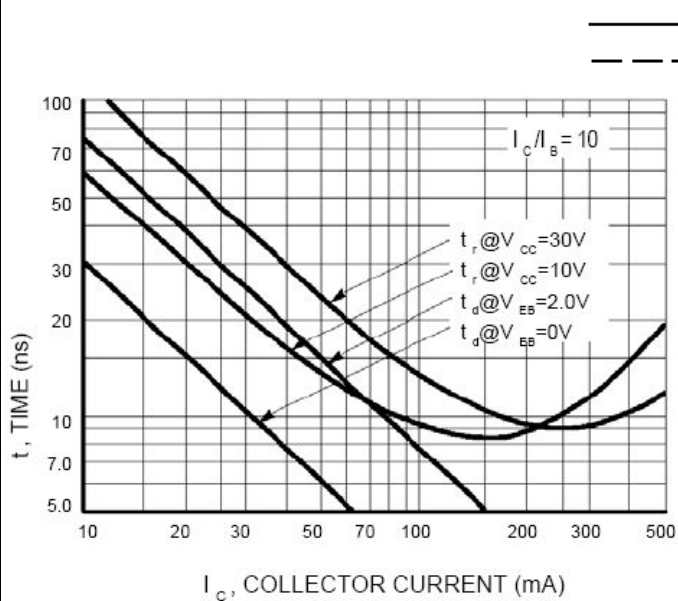


Fig.2 Rise Time & Fall Time

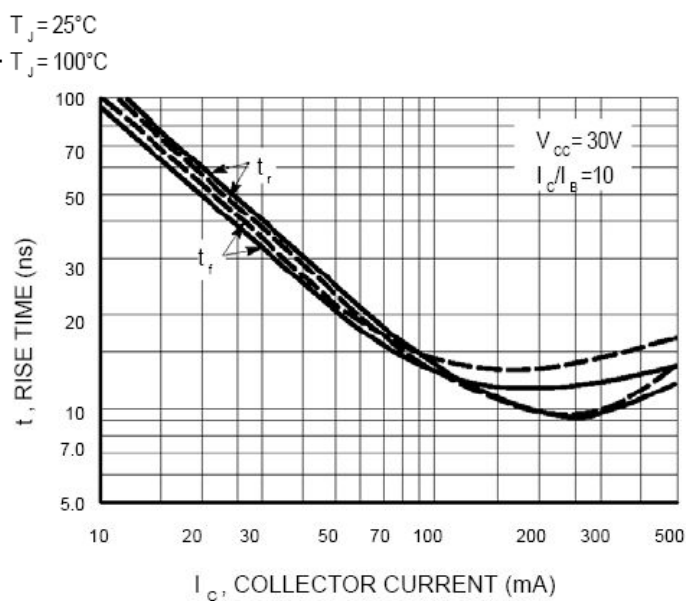


Fig.3 Storage Time

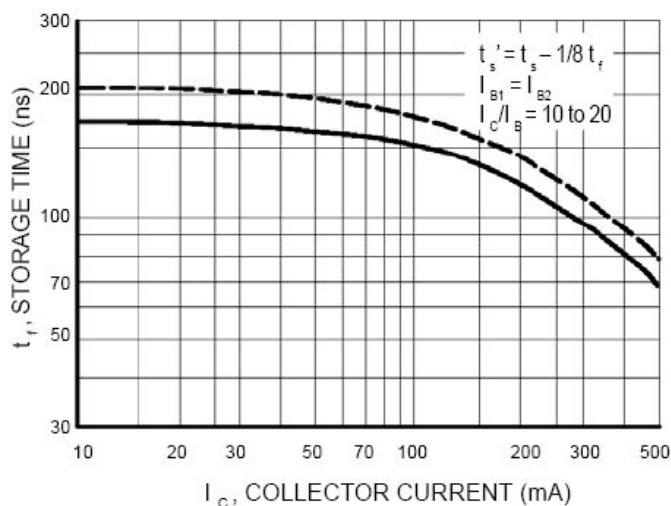


Fig.4 Fall Time

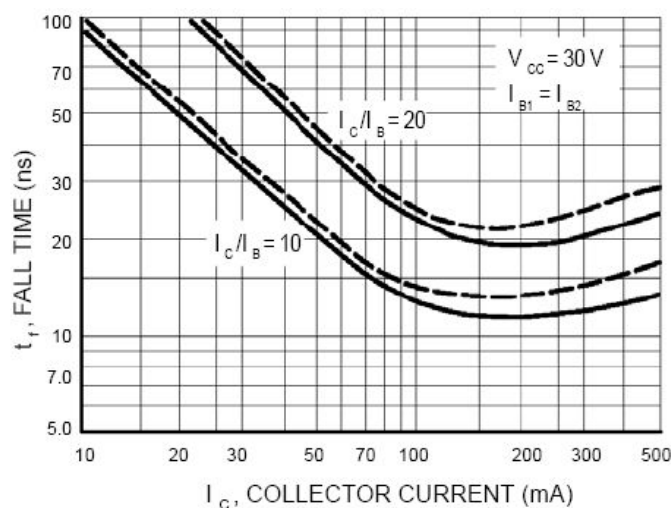
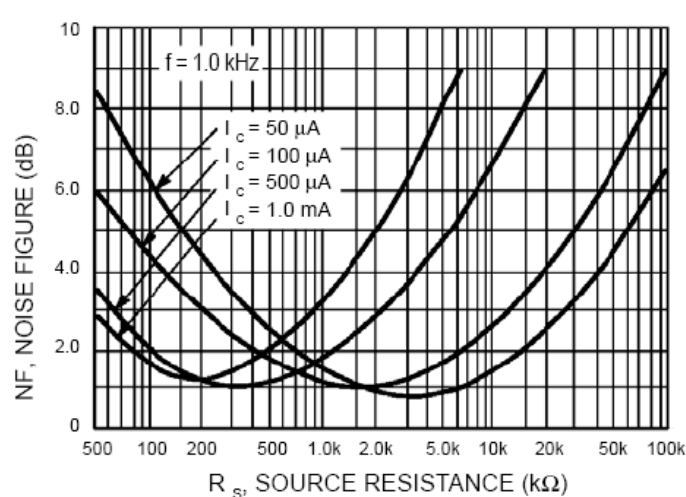
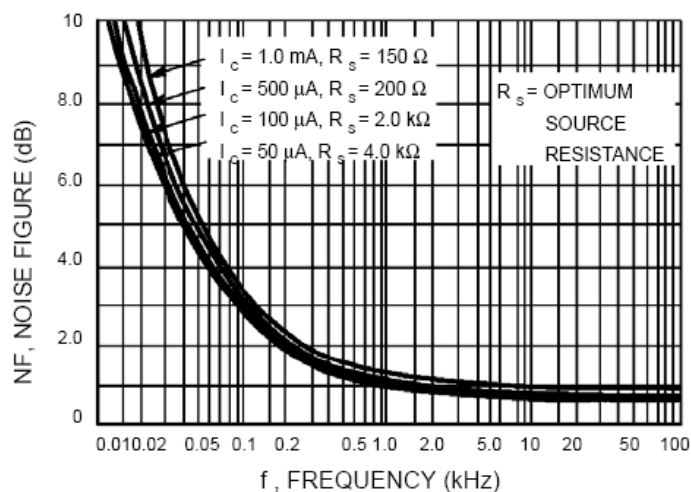


Fig.5 Frequency Effects

Fig.6 Source Resistance Effects

$V_{CE} = 10\text{ Vdc}$, $T_A = 25^\circ\text{C}$

Bandwidth = 1.0 Hz



Electrical characteristic curves

Fig.7 Current Gain

($V_{CE} = 10\text{ Vdc}$, $f = 1.0\text{ kHz}$, $T_A = 25^\circ\text{C}$)

This group of graphs illustrates the relationship between h_{fe} and other “h” parameters for this series of transistors. To obtain these curves, a high-gain and a low-gain unit were selected from the LMBT4401WT1G lines, and the same units were used to develop the correspondingly numbered curves on each graph.

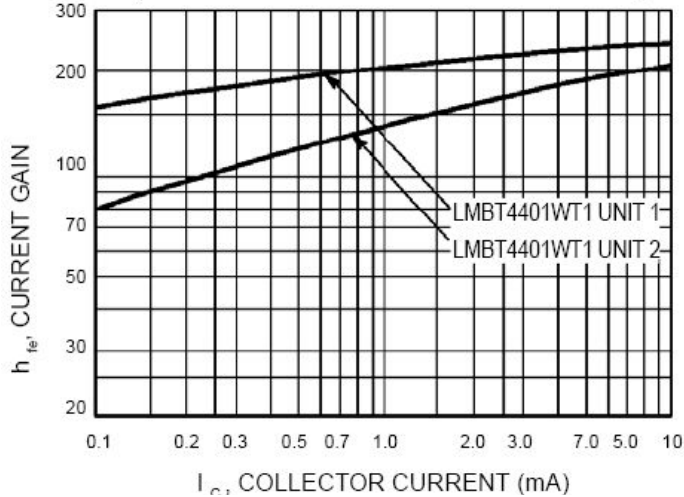


Fig.8 Input Admittance

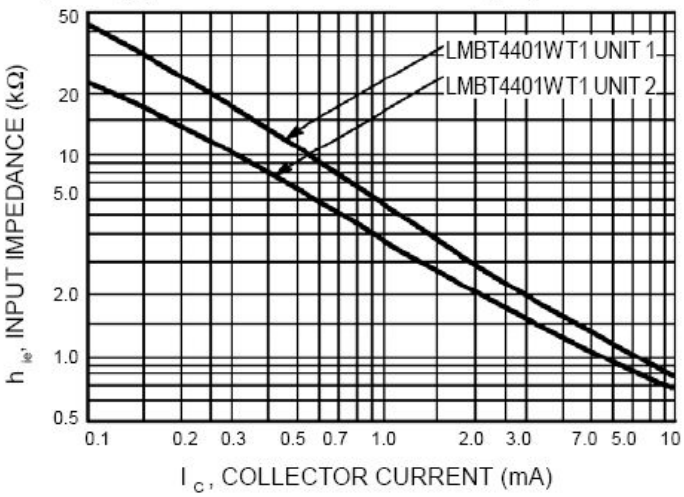


Fig.9 Voltage Feedback Ratio

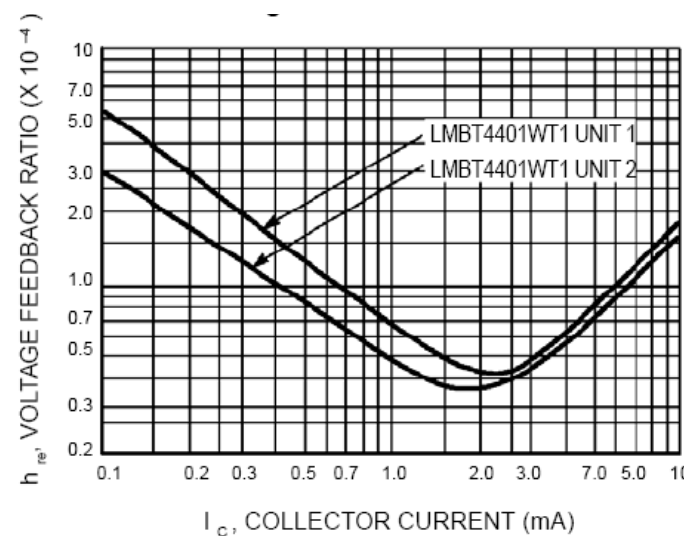


Fig.10 Output Impedance

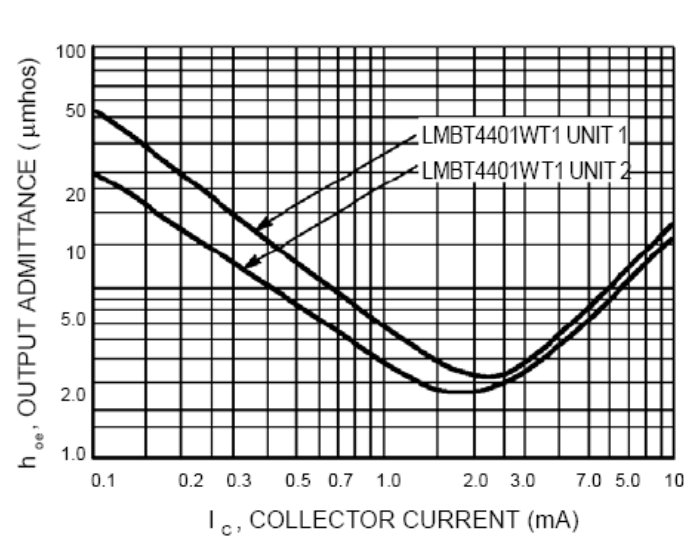
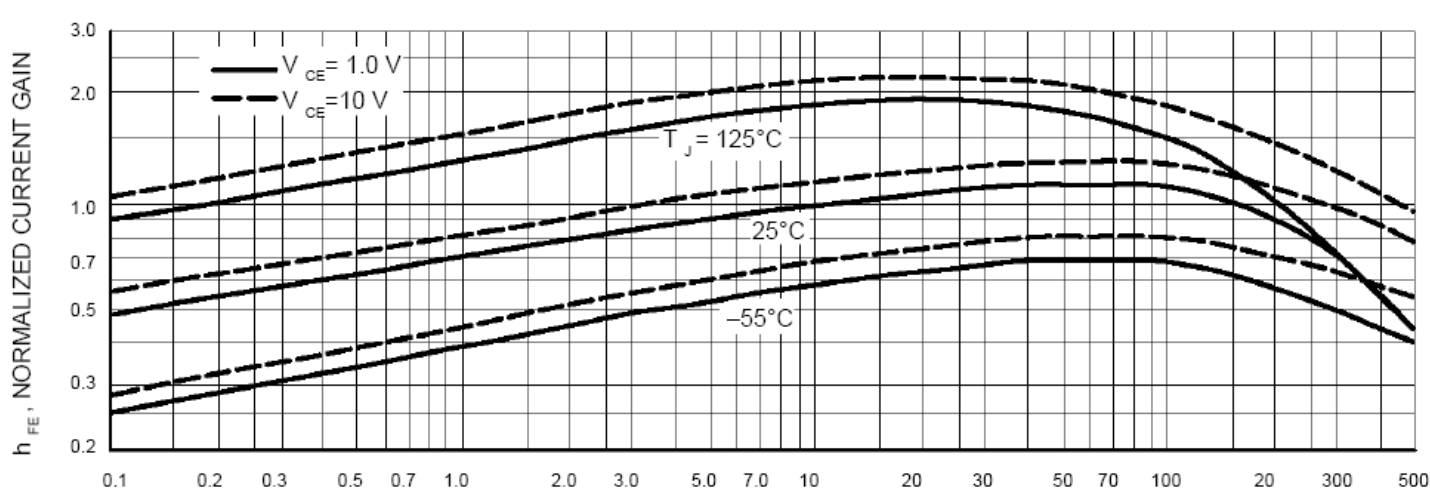


Fig.11 DC Current Gain



Electrical characteristic curves

Fig.12 Collector Saturation Region

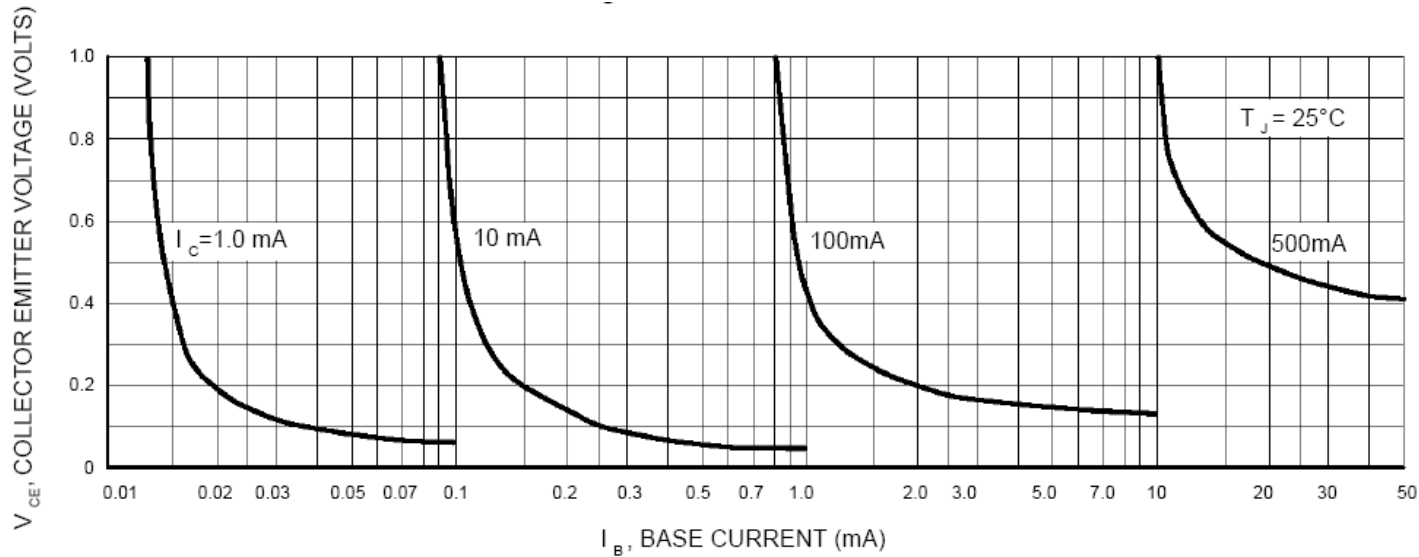


Fig.13 ON Voltage

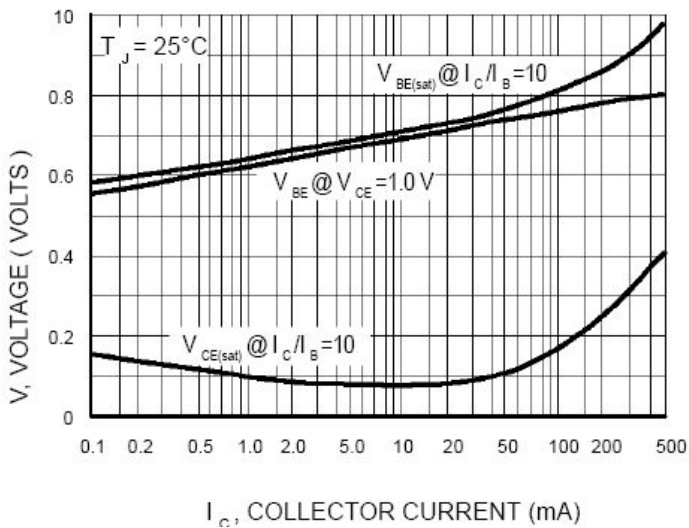


Fig.14 Temperature Coefficients

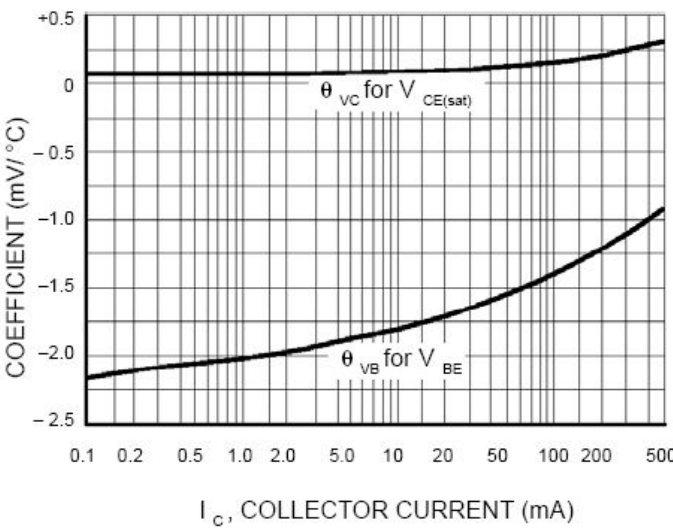


Fig.15 Capacitance

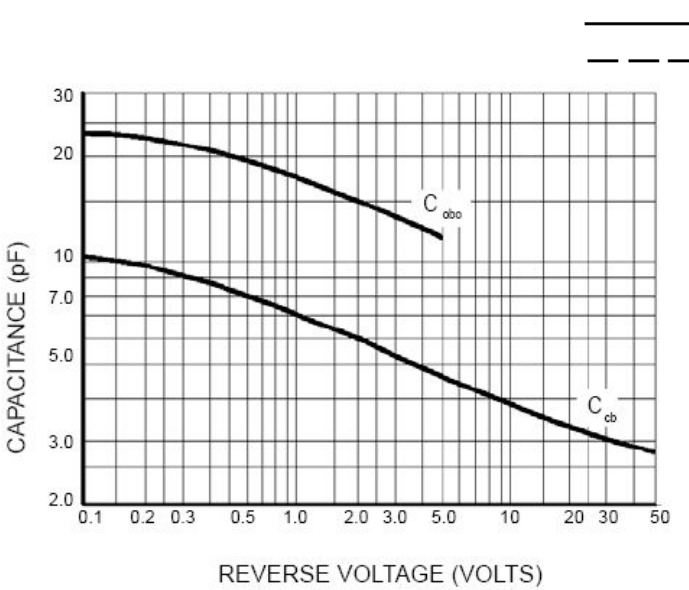
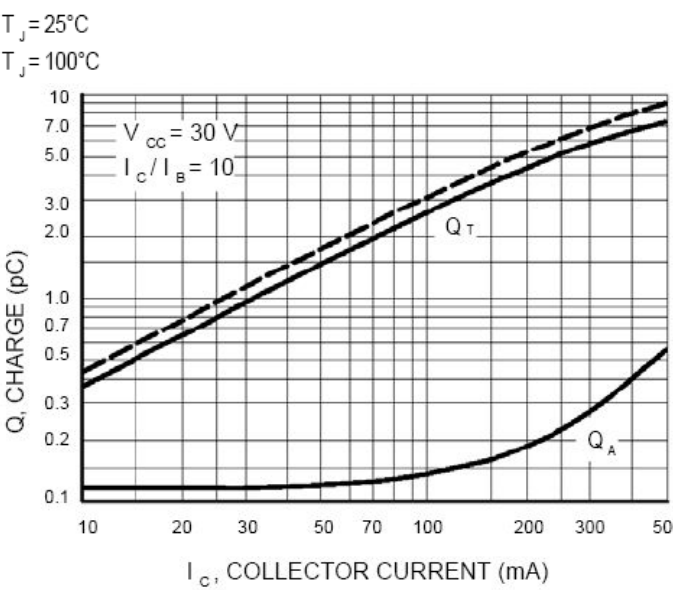


Fig.16 Charge Data



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New Marking Rule Notification

Range: In order to have well management in process control, the new marking rule is applied to small signal device including Switching Diode, Transistor and Schottky Diode.

Package: SOT-23 / SOT-323 / SOT-523

