

SuperSOT

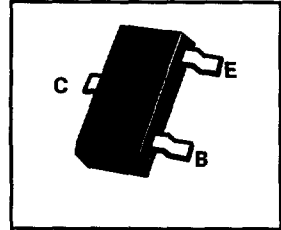
SOT23 NPN SILICON POWER (SWITCHING) TRANSISTORS

FMMT617 FMMT618
FMMT619 FMMT624
FMMT625

ISSUE 3 - NOVEMBER 1995

FEATURES

- * **625mW POWER DISSIPATION**
- * I_C CONT 3A
- * 12A Peak Pulse Current
- * Excellent H_{FE} Characteristics Up To 12A (pulsed)
- * Extremely Low Saturation Voltage E.g. 8mV Typ.
- * Extremely Low Equivalent On Resistance; $R_{CE(sat)}$



DEVICE TYPE	COMPLEMENT	PARTMARKING	$R_{CE(sat)}$
FMMT617	FMMT717	617	50m Ω at 3A
FMMT618	FMMT718	618	50m Ω at 2A
FMMT619	FMMT720	619	75m Ω at 2A
FMMT624	FMMT723	624	-
FMMT625	-	625	-

ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	FMMT 617	FMMT 618	FMMT 619	FMMT 624	FMMT 625	UNIT
Collector-Base Voltage	V_{CBO}	15	20	50	125	150	V
Collector-Emitter Voltage	V_{CEO}	15	20	50	125	150	V
Emitter-Base Voltage	V_{EBO}	5	5	5	5	5	V
Peak Pulse Current**	I_{CM}	12	6	6	3	3	A
Continuous Collector Current	I_C	3	2.5	2	1	1	A
Base Current	I_B	500					mA
Power Dissipation at $T_{amb}=25^\circ\text{C}$ *	P_{tot}	625					mW
Operating and Storage Temperature Range	$T_j; T_{stg}$	-55 to +150					$^\circ\text{C}$

* Maximum power dissipation is calculated assuming that the device is mounted on a ceramic substrate measuring 15x15x0.6mm

**Measured under pulsed conditions. Pulse width=300 μs . Duty cycle \leq 2%
Spice parameter data is available upon request for these devices

FMMT617

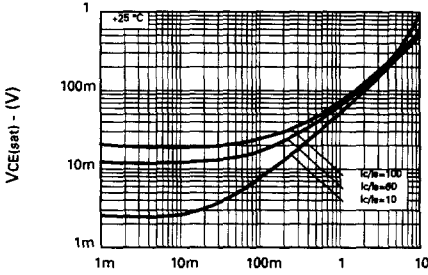
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	15	70		V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	15	18		V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	8.2		V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}			100	nA	$V_{CB}=10\text{V}$
Emitter Cut-Off Current	I_{EBO}			100	nA	$V_{EB}=4\text{V}$
Collector Emitter Cut-Off Current	I_{CES}			100	nA	$V_{CES}=10\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		8 70 150	14 100 200	mV mV mV	$I_C=0.1\text{A}, I_B=10\text{mA}^*$ $I_C=1\text{A}, I_B=10\text{mA}^*$ $I_C=3\text{A}, I_B=50\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.9	1.0	V	$I_C=3\text{A}, I_B=50\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.84	1.0	V	$I_C=3\text{A}, V_{CE}=2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	200 300 200 150	415 450 320 240 80			$I_C=10\text{mA}, V_{CE}=2\text{V}^*$ $I_C=200\text{mA}, V_{CE}=2\text{V}^*$ $I_C=3\text{A}, V_{CE}=2\text{V}^*$ $I_C=5\text{A}, V_{CE}=2\text{V}^*$ $I_C=12\text{A}, V_{CE}=2\text{V}^*$
Transition Frequency	f_T	80	120		MHz	$I_C=50\text{mA}, V_{CE}=10\text{V}$ $f=50\text{MHz}$
Output Capacitance	C_{obo}		30	40	pF	$V_{CB}=10\text{V}, f=1\text{MHz}$
Turn-On Time	$t_{(on)}$		120		ns	$V_{CC}=10\text{V}, I_C=3\text{A}$ $I_{B1}=I_{B2}=50\text{mA}$
Turn-Off Time	$t_{(off)}$		160		ns	

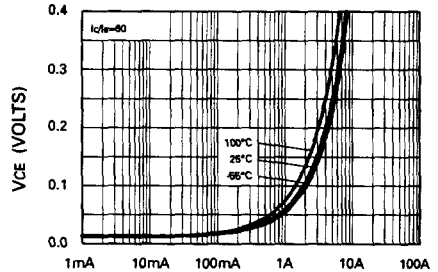
*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle \leq 2%

FM6T617

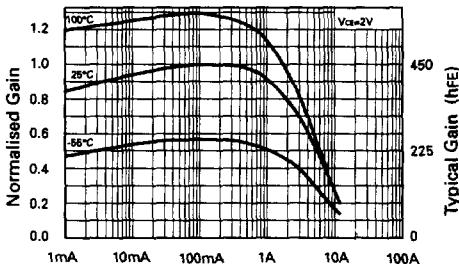
TYPICAL CHARACTERISTICS



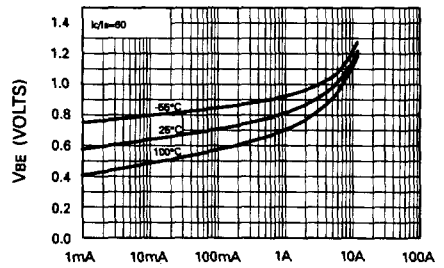
I_C - Collector Current (A)
 $V_{CE(sat)}$ v I_C



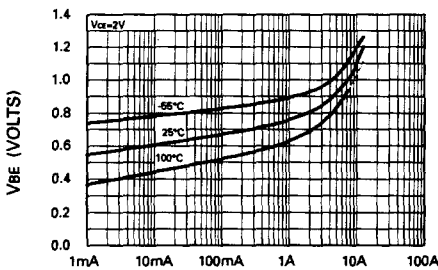
Collector Current
 $V_{CE(sat)}$ vs I_C



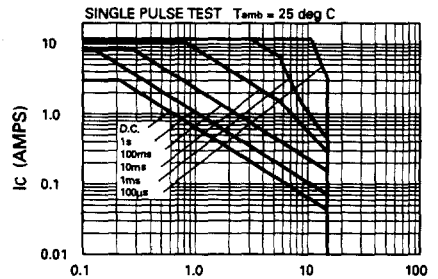
Collector Current
hFE vs I_C



Collector Current
 $V_{BE(sat)}$ vs I_C



Collector Current
 $V_{BE(ON)}$ vs I_C



Safe Operating Area

FMMT618 FMMT619

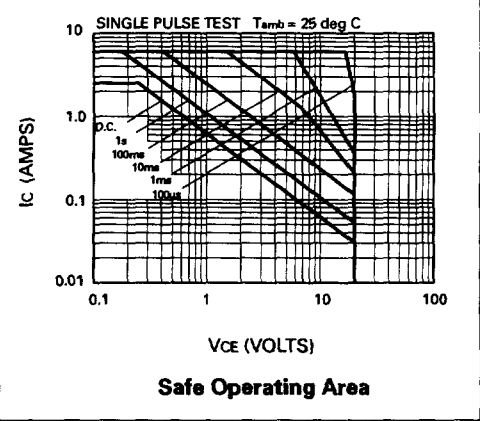
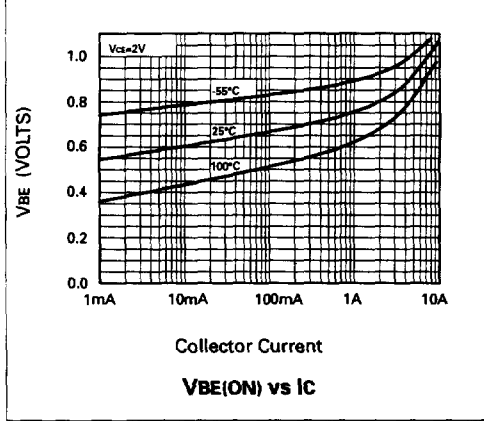
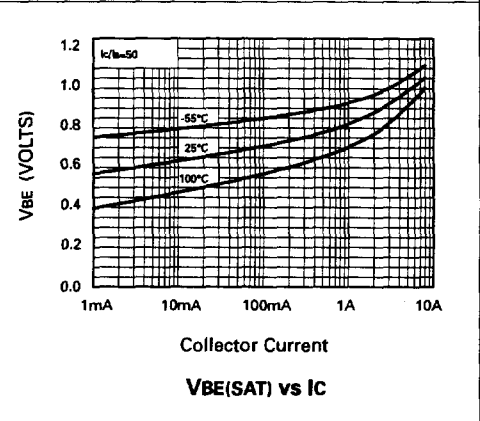
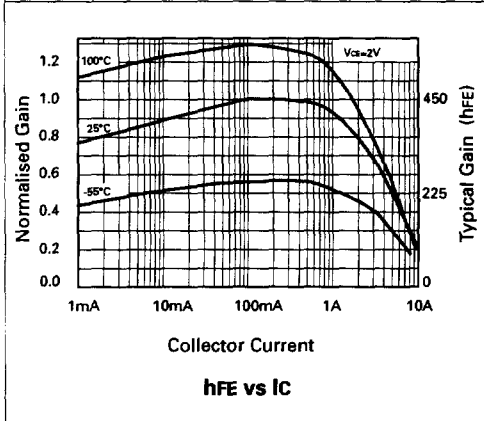
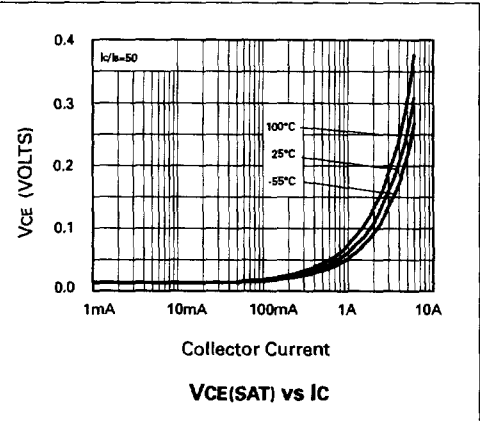
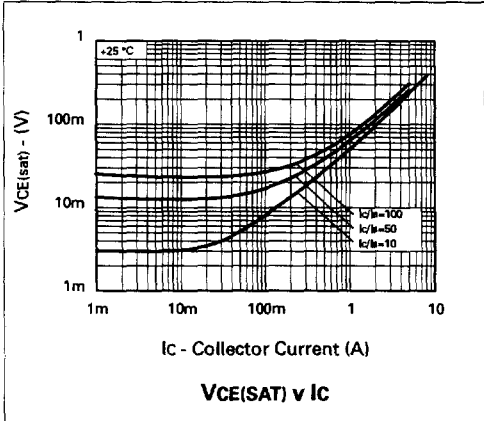
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	FMMT618			FMMT619			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	20	100		50	190		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	20	27		50	65		V	$I_C = 10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	8.3		5	8.3		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}			100			100	nA nA	$V_{CB} = 16\text{V}$ $V_{CB} = 40\text{V}$
Emitter Cut-Off Current	I_{EBO}			100			100	nA	$V_{EB} = 4\text{V}$
Collector Emitter Cut-Off Current	I_{CES}			100			100	nA nA	$V_{CES} = 16\text{V}$ $V_{CES} = 40\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$		8 70 130	15 150 200	10 125 150	20 200 220	mV mV mV		$I_C = 0.1\text{A}, I_B = 10\text{mA}^*$ $I_C = 1\text{A}, I_B = 10\text{mA}^*$ $I_C = 2\text{A}, I_B = 50\text{mA}^*$ $I_C = 2.5\text{A}, I_B = 50\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$		0.89	1.0		0.87 1.0	V V		$I_C = 2\text{A}, I_B = 50\text{mA}^*$ $I_C = 2.5\text{A}, I_B = 50\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$		0.79	1.0		0.80 1.0	V V		$I_C = 2\text{A}, V_{CE} = 2\text{V}^*$ $I_C = 2.5\text{A}, V_{CE} = 2\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	200 300	400 450		200 300 200	400 450 400			$I_C = 10\text{mA}, V_{CE} = 2\text{V}^*$ $I_C = 200\text{mA}, V_{CE} = 2\text{V}^*$ $I_C = 1\text{A}, V_{CE} = 2\text{V}^*$ $I_C = 2\text{A}, V_{CE} = 2\text{V}^*$ $I_C = 6\text{A}, V_{CE} = 2\text{V}^*$
Transition Frequency	f_T	100	140		100	165		MHz	$I_C = 50\text{mA}, V_{CE} = 10\text{V}$ $f = 100\text{MHz}$
Output Capacitance	C_{obo}		23	30		12	20	pF	$V_{CB} = 10\text{V}, f = 1\text{MHz}$
Turn-On Time	$t_{(on)}$		170			170		ns	$V_{CC} = 10\text{V}, I_C = 1\text{A}$
Turn-Off Time	$t_{(off)}$		400			750		ns	$I_{B1} = -I_{B2} = 10\text{mA}$

*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle \leq 2%

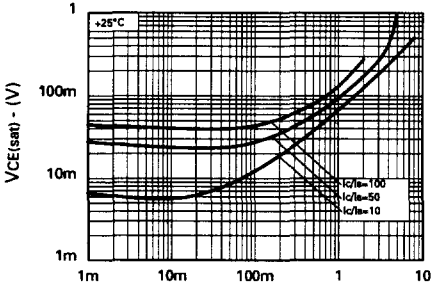
FMMT618

TYPICAL CHARACTERISTICS

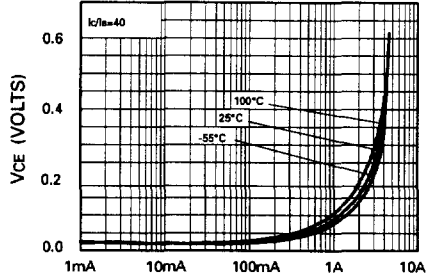


FMMT619

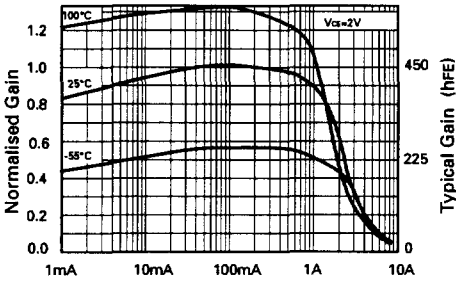
TYPICAL CHARACTERISTICS



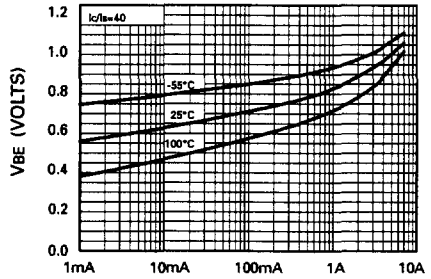
I_C - Collector Current (A)
 $V_{CE(sat)}$ v I_C



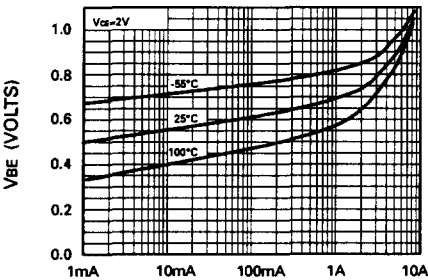
Collector Current
 $V_{CE(SAT)}$ vs I_C



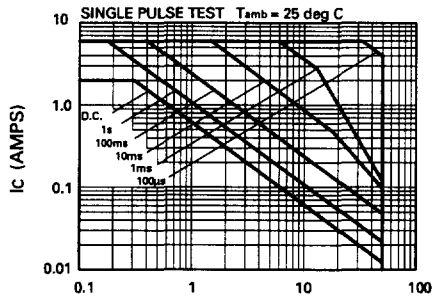
Collector Current
hFE vs I_C



Collector Current
 $V_{BE(SAT)}$ vs I_C



Collector Current
 $V_{BE(ON)}$ vs I_C



Safe Operating Area

FMMT624 FMMT625

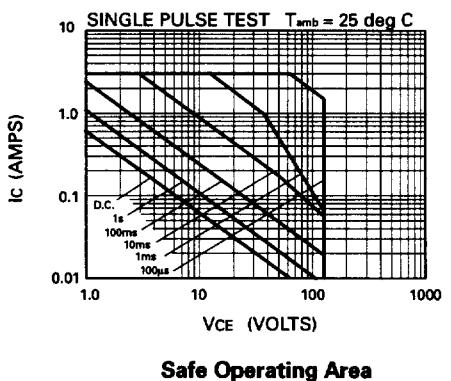
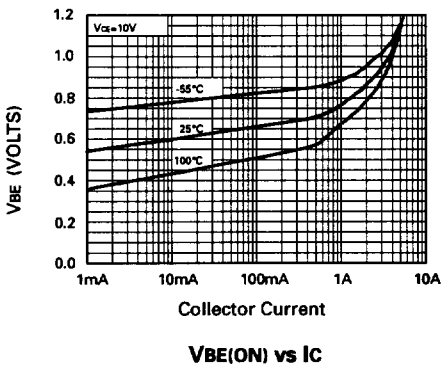
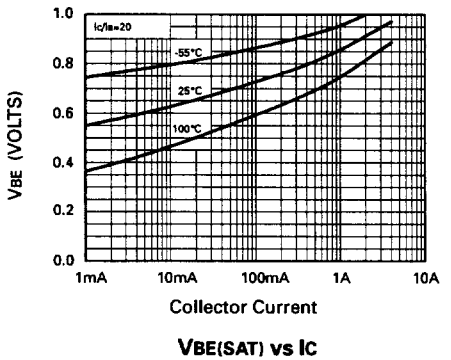
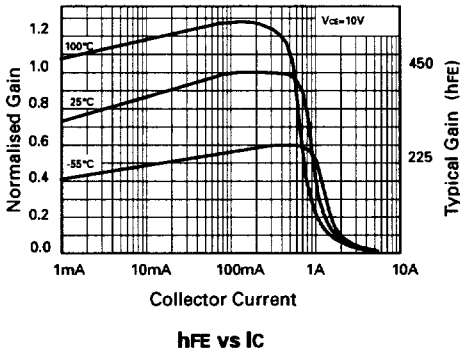
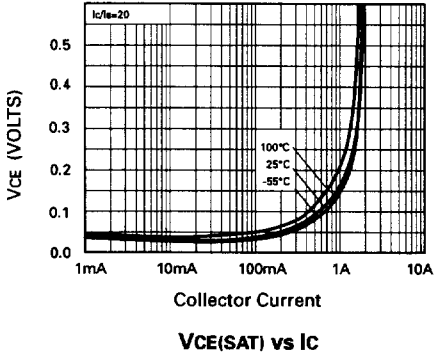
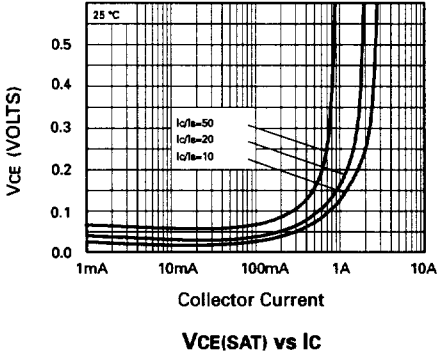
ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

PARAMETER	SYMBOL	FMMT624			FMMT625			UNIT	CONDITIONS.
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.		
Collector-Base Breakdown Voltage	$V_{(BR)ICBO}$	125	250		150	300		V	$I_C=100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	125	160		150	175		V	$I_C=10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	5	8.3		5	8.3		V	$I_E=100\mu\text{A}$
Collector Cut-Off Current	I_{CBO}			100			100	nA nA	$V_{CB}=100\text{V}$ $V_{CB}=130\text{V}$
Emitter Cut-Off Current	I_{EBO}			100			100	nA	$V_{EB}=4\text{V}$
Collector Emitter Cut-Off Current	I_{CES}			100			100	nA nA	$V_{CES}=100\text{V}$ $V_{CES}=130\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$		26 70 160 165	50 150 220 250		26 110 180 300	50 200	mV mV mV mV	$I_C=0.1\text{A}, I_B=10\text{mA}^*$ $I_C=0.1\text{A}, I_B=1\text{mA}^*$ $I_C=0.5\text{A}, I_B=50\text{mA}^*$ $I_C=0.5\text{A}, I_B=10\text{mA}^*$ $I_C=1\text{A}, I_B=50\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(SAT)}$		0.85	1.0		0.85	1.0	V	$I_C=1\text{A}, I_B=50\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(ON)}$		0.7	1.0		0.74	1.0	V	$I_C=1\text{A}, V_{CE}=10\text{V}^*$
Static Forward Current Transfer Ratio	h_{FE}	200 300 100	400 450 140 18		200 300 30	400 450 45 15			$I_C=10\text{mA}, V_{CE}=10\text{V}^*$ $I_C=0.2\text{A}, V_{CE}=10\text{V}^*$ $I_C=1\text{A}, V_{CE}=10\text{V}^*$ $I_C=3\text{A}, V_{CE}=10\text{V}^*$
Transition Frequency	f_T	100	155		100	135		MHz	$I_C=50\text{mA}, V_{CE}=10\text{V}$ $f=100\text{MHz}$
Output Capacitance	C_{OBO}		7	15		6	10	pF	$V_{CB}=10\text{V}, f=1\text{MHz}$
Turn-On Time	$t_{(ON)}$		60			160		ns	$V_{CC}=50\text{V}, I_C=0.5\text{A}$
Turn-Off Time	$t_{(OFF)}$		1300			1500		ns	$I_{B1}=-I_{B2}=50\text{mA}$

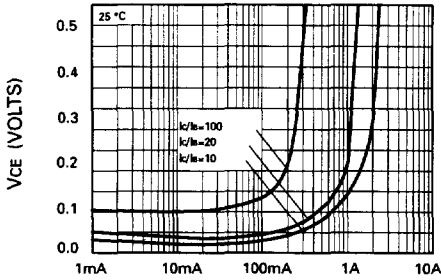
*Measured under pulsed conditions. Pulse width=300 μs . Duty cycle $\leq 2\%$

FMMT624

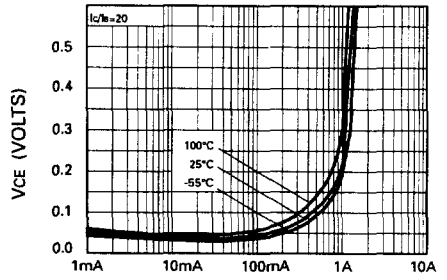
TYPICAL CHARACTERISTICS



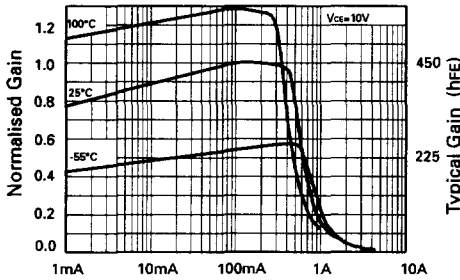
TYPICAL CHARACTERISTICS



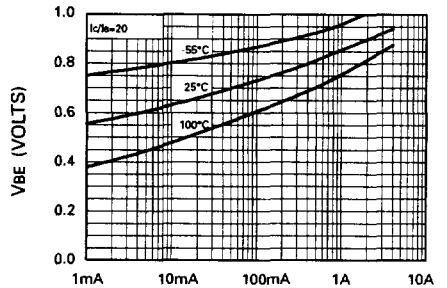
Collector Current
VCE(SAT) vs IC



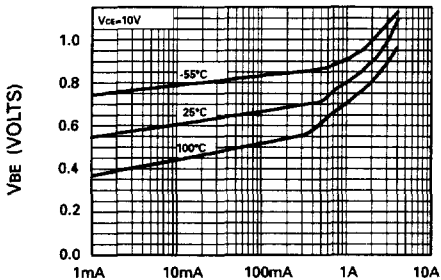
Collector Current
VCE(SAT) vs IC



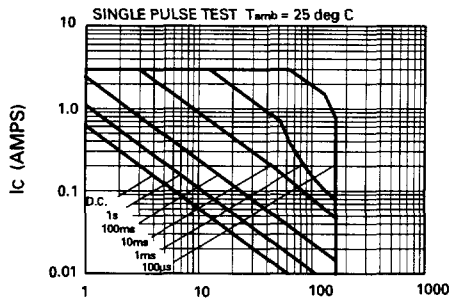
Collector Current
hFE vs IC



Collector Current
VBE(SAT) vs IC



Collector Current
VBE(ON) vs IC



Safe Operating Area