Ordering number : ENN7129

PNP / NPN Silicon Epitaxial Planar Transistors

MCH3109 / MCH3209

DC / DC Converter Applications

Applications

- Relay drivers, lamp drivers, motor drivers, strobes.

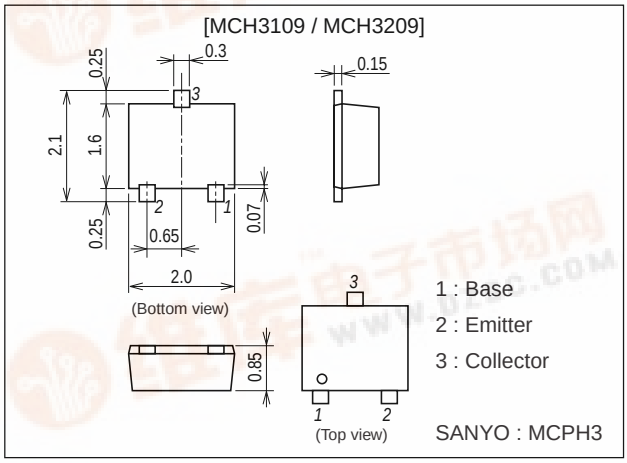
Features

- Adoption of MBIT processes.
- High current capacitance.
- Low collector-to-emitter saturation voltage.
- High-speed switching.
- Ultrasmall package facilitates miniaturization in end products (0.85mm).
- High allowable power dissipation.

Package Dimensions

unit : mm

2194A



Specifications ( ) : MCH3109

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Collector-to-Base Voltage	V_{CBO}		(-30)40	V
Collector-to-Emitter Voltage	V_{CEO}		(-)30	V
Emitter-to-Base Voltage	V_{EBO}		(-)5	V
Collector Current	I_C		(-)3	A
Collector Current (Pulse)	I_{CP}		(-)5	A
Base Current	I_B		(-)600	mA
Collector Dissipation	P_C	Mounted on a ceramic board(600mm²X0.8mm)	0.8	W
Junction Temperature	Tj		150	°C
Storage Temperature	Tstg		-55 to +150	°C

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector Cutoff Current	I_{CBO}	V_{CB}=(-)30V, I_E=0			(-)0.1	μA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(-)4V, I_C=0			(-)0.1	μA
DC Current Gain	h_{FE}	V_{CE}=(-)2V, I_C=(-)500mA	200		560	
Gain-Bandwidth Product	f_T	V_{CE}=(-)10V, I_C=(-)500mA		(380)450		MHz
Output Capacitance	Cob	V_{CB}=(-)10V, f=1MHz		(25)20		pF

Marking : MCH3109 : AJ / MCH3209 : CJ

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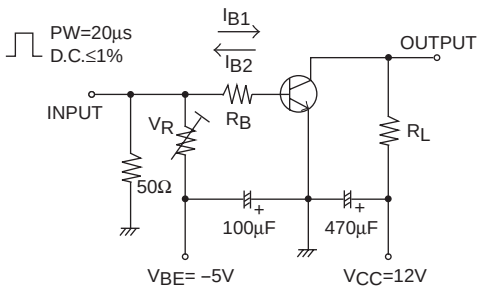
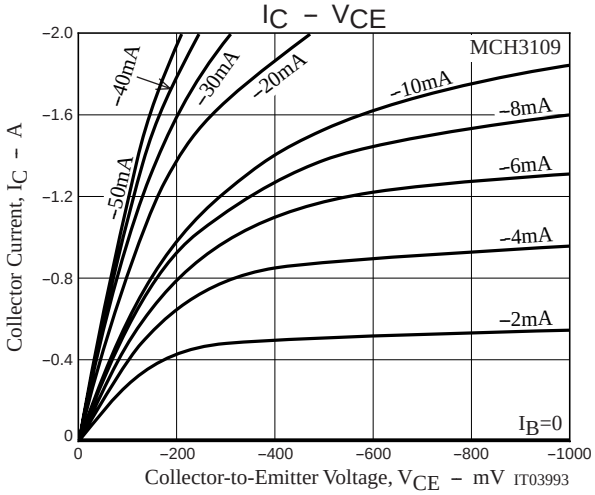
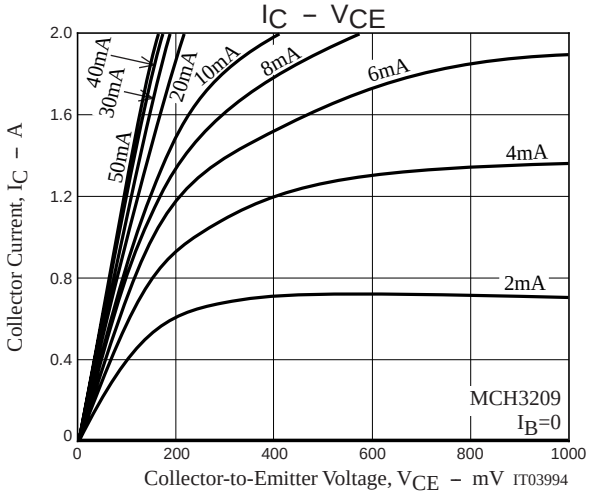
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)1	I_C=(–)1.5A, I_B=(–)30mA		(–155)	(–230)	mV
				120	180	mV
	V_{CE}(sat)2	I_C=(–)1.5A, I_B=(–)750mA		(–)105	(–)155	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(–)1.5A, I_B=(–)30mA		(–)0.83	(–)1.2	V
Collector-to-Base Breakdown Voltage	$V_{(BR)CBO}$	I_C=(–)10μA, I_E=0	(–30)40			V
Collector-to-Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C=(–)1mA, R_{BE}=∞	(–)30			V
Emitter-to-Base Breakdown Voltage	$V_{(BR)EBO}$	I_E=(–)10μA, I_C=0	(–)5			V
Turn-ON Time	t_{on}	See specified Test Circuit.		(50)30		ns
Storage Time	t_{stg}	See specified Test Circuit.		(270)300		ns
Fall Time	t_f	See specified Test Circuit.		(25)15		ns

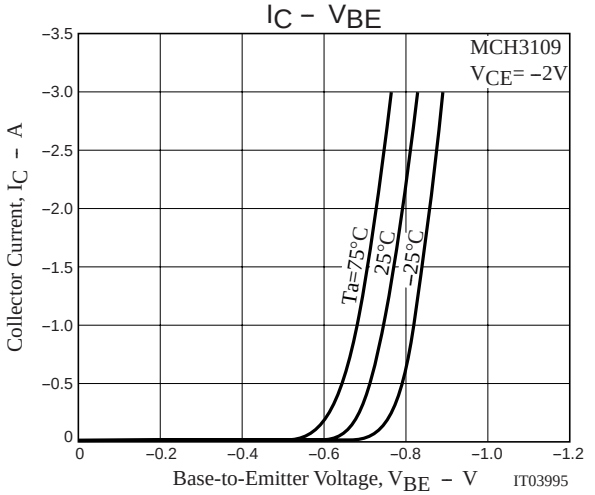
Switching Time Test Circuit

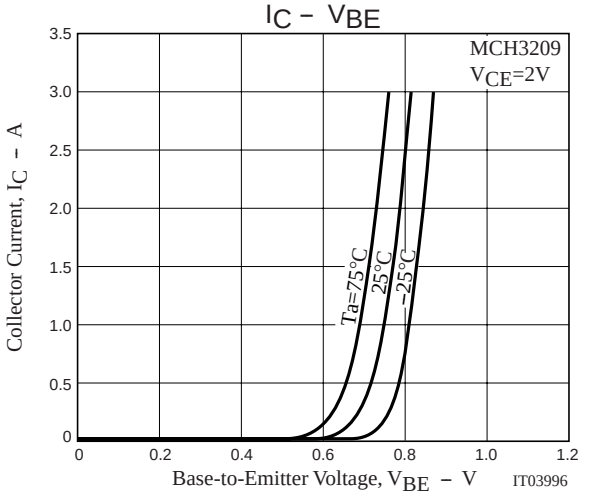


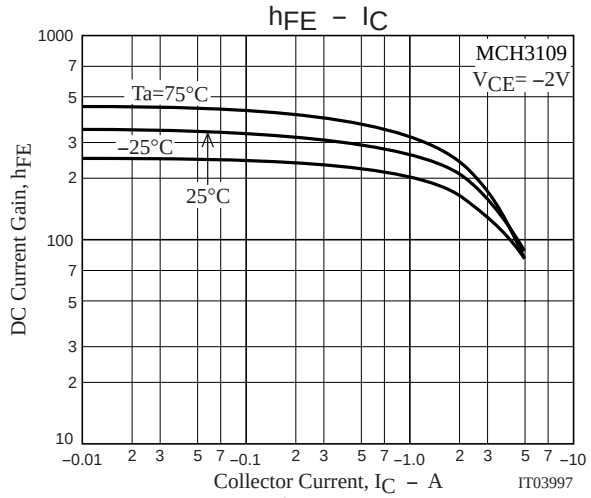
I_C=20I_{B1}= –20I_{B2}=500mA
(For PNP, the polarity is reversed.)

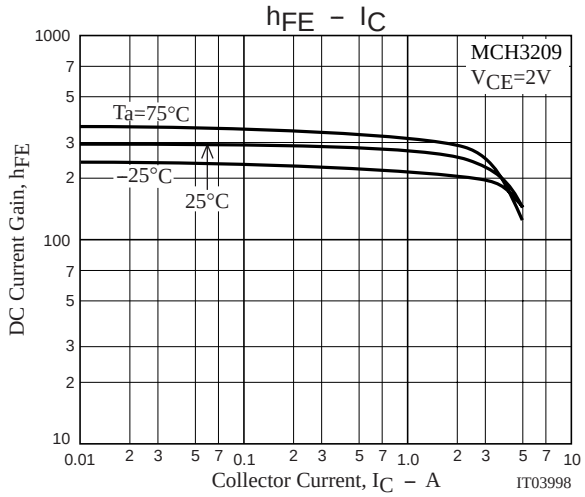


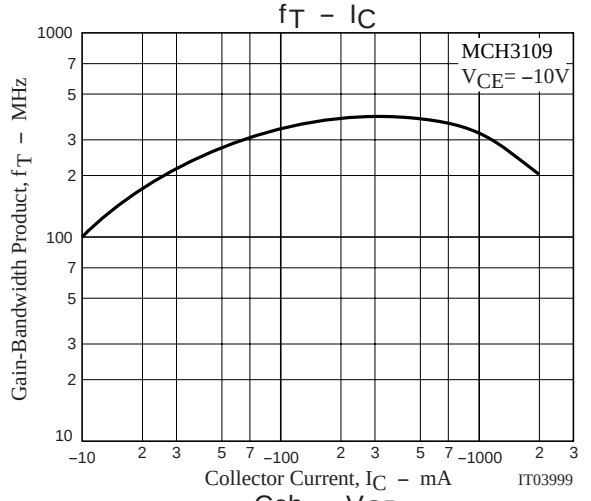


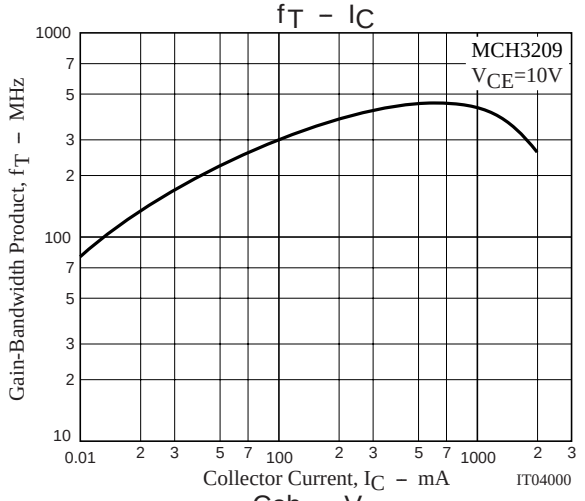


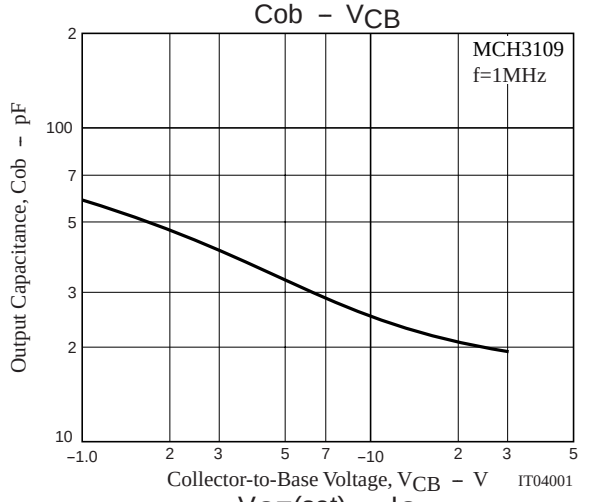


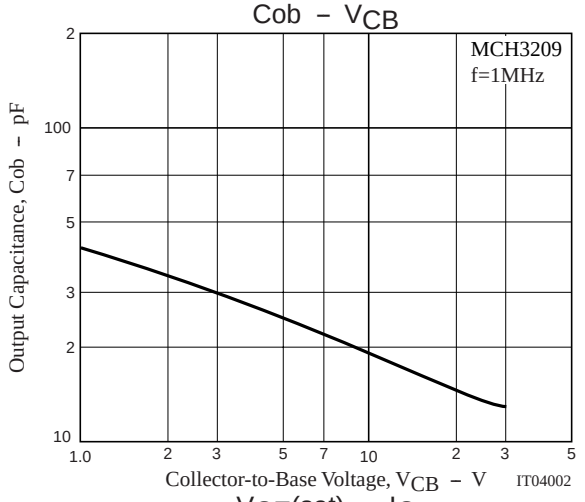

hFE – IC
MCH3109
VCE= –2V
Ta=75°C
–25°C
25°C
DC Current Gain, hFE
Collector Current, IC – A
IT03997

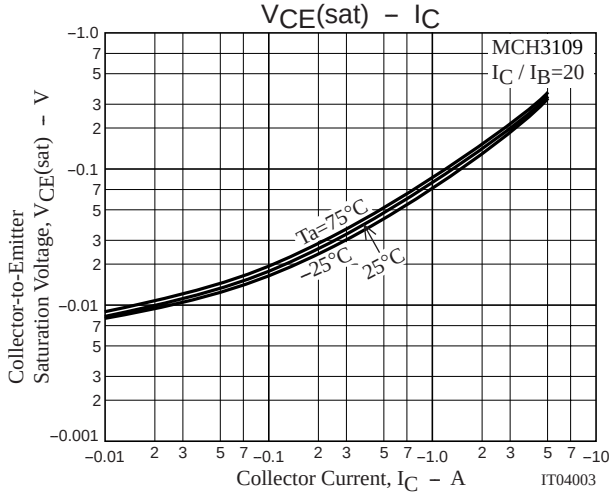

hFE – IC
MCH3209
VCE=2V
Ta=75°C
–25°C
25°C
DC Current Gain, hFE
Collector Current, IC – A
IT03998

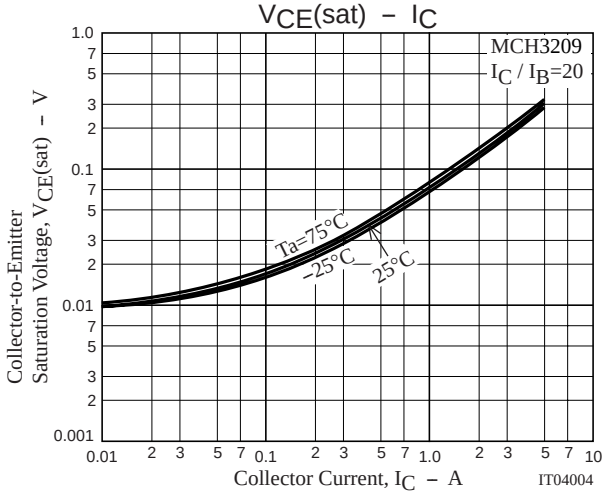

fT – IC
MCH3109
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT03999

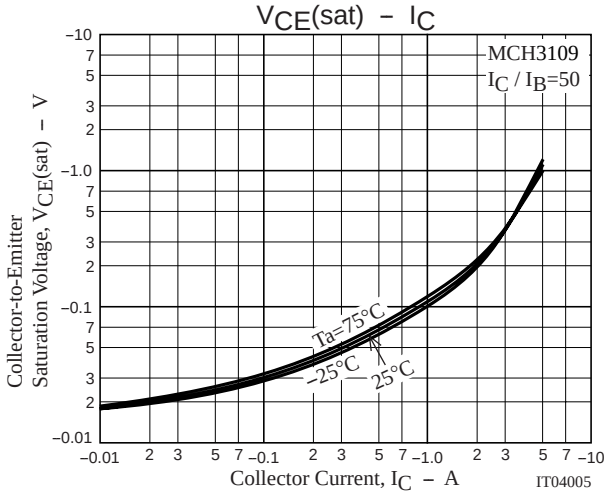

fT – IC
MCH3209
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT04000

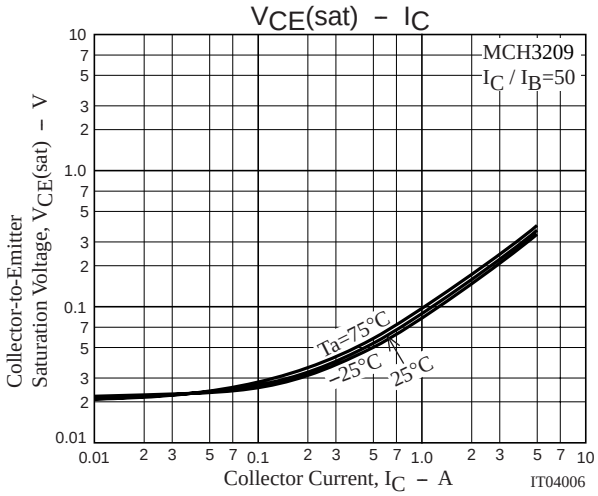

Cob – VCB
MCH3109
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT04001

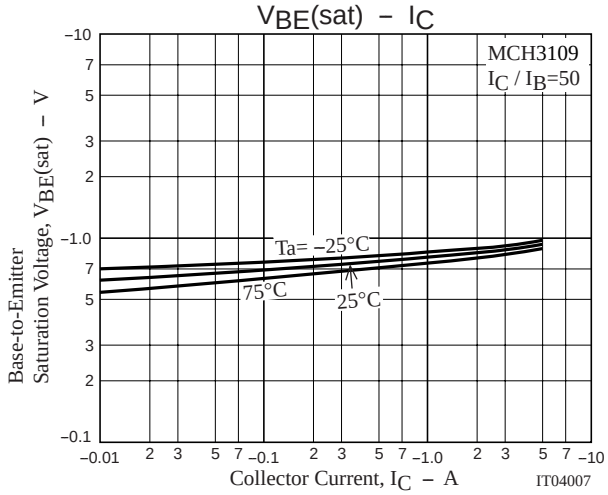

Cob – VCB
MCH3209
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT04002

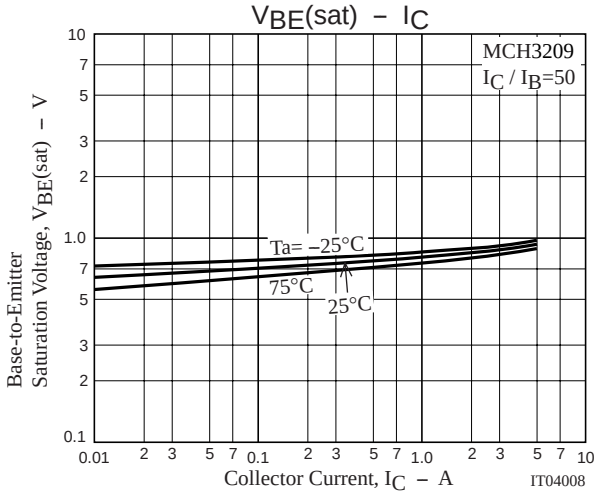

VCE(sat) – IC
MCH3109
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT04003

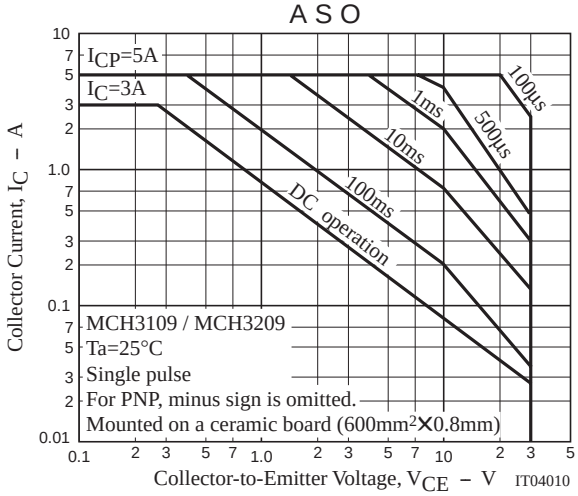

VCE(sat) – IC
MCH3209
IC / IB=20
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT04004

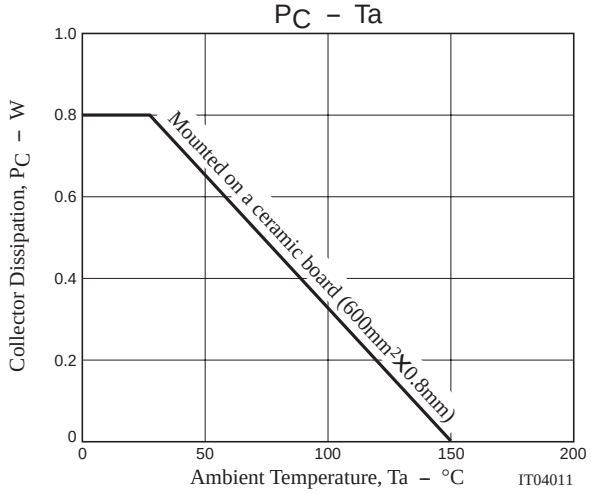

VCE(sat) – IC
MCH3109
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT04005


VCE(sat) – IC
MCH3209
IC / IB=50
Ta=75°C
–25°C
25°C
Collector-to-Emitter Saturation Voltage, VCE(sat) – V
Collector Current, IC – A
IT04006


VBE(sat) – IC
MCH3109
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT04007


VBE(sat) – IC
MCH3209
IC / IB=50
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – A
IT04008


A S O
ICP=5A
IC=3A
100µs
1ms
500µs
10ms
100ms
DC operation
MCH3109 / MCH3209
Ta=25°C
Single pulse
For PNP, minus sign is omitted.
Mounted on a ceramic board (600mm2×0.8mm)
Collector Current, IC – A
Collector-to-Emitter Voltage, VCE – V
IT04010


PC – Ta
Mounted on a ceramic board (600mm2×0.8mm)
Collector Dissipation, PC – W
Ambient Temperature, Ta – °C
IT04011