MCH5541 — PNP / NPN Epitaxial Planar Silicon Transistor
Push-Pull Circuit Applications

Applications

- MOSFET gate drivers, relay drivers, lamp drivers, motor drivers.

Features

- Composite type with a PNP / NPN transistor contained in one package, facilitating high-density mounting.
- Ultrasmall package permitting applied sets to be small and slim.

Specifications ( ) : PNP

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)30	V
Emitter-to-Base Voltage	V_{EBO}		(-)5	V
Collector Current	I_C		(-)700	mA
Collector Current (Pulse)	I_{CP}	PW≤10μs	(-)3	A
Collector Dissipation	P_C	Mounted on a ceramic board (600mm²×0.8m)	0.5	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			(-)100	nA
Emitter Cutoff Current	I_{EBO}	V_{EB}=(-)4V, I_C=0			(-)100	nA
DC Current Gain	h_{FE}	V_{CE}=(-)2V, I_C=(-10)50mA	(200)300		(500)800	
Gain-Bandwidth Product	f_T	V_{CE}=(-)2V, I_C=(-)50mA		(520)540		MHz
Output Capacitance	Cob	V_{CB}=(-)10V, f=1MHz		(4.7)3.3		pF
Collector-to-Emitter Saturation Voltage	V_{CE}(sat)	I_C=(-)200mA, I_B=(-)10mA		(-110)85	(-220)190	mV
Base-to-Emitter Saturation Voltage	V_{BE}(sat)	I_C=(-)200mA, I_B=(-)10mA		(-)0.9	(-)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

Marking : E1

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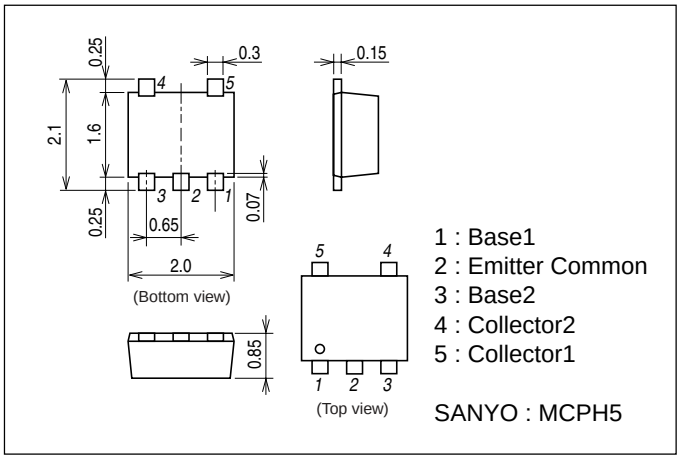
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Turn-ON Time	ton	See specified Test Circuit.		35		ns
Storage Time	t_{stg}	See specified Test Circuit.		(125)255		ns
Fall Time	t_f	See specified Test Circuit		(25)40		ns

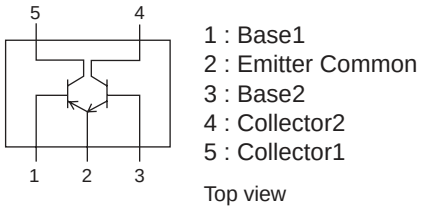
Package Dimensions

unit : mm

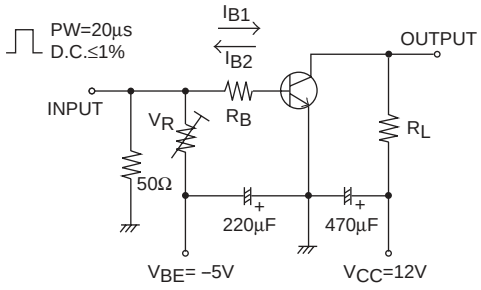
2239



Electrical Connection

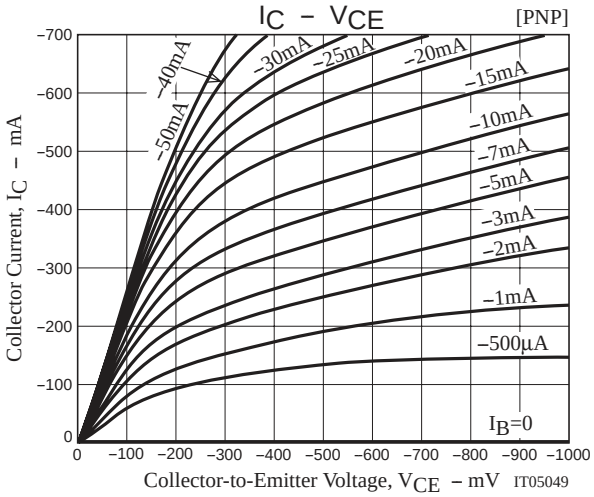


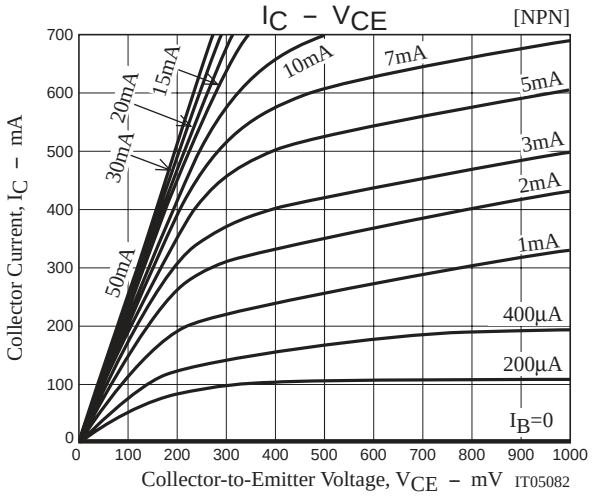
Switching Time Test Circuit

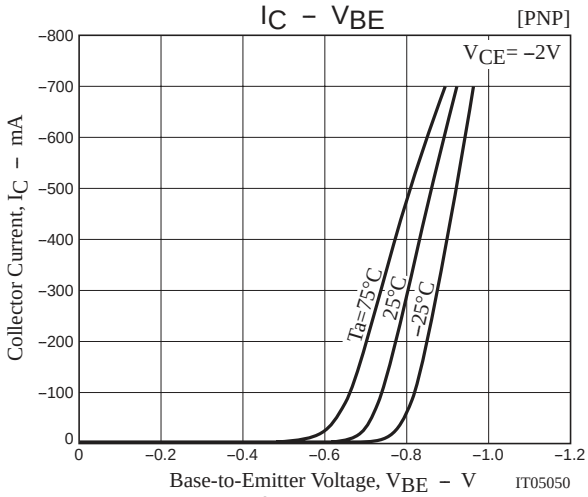


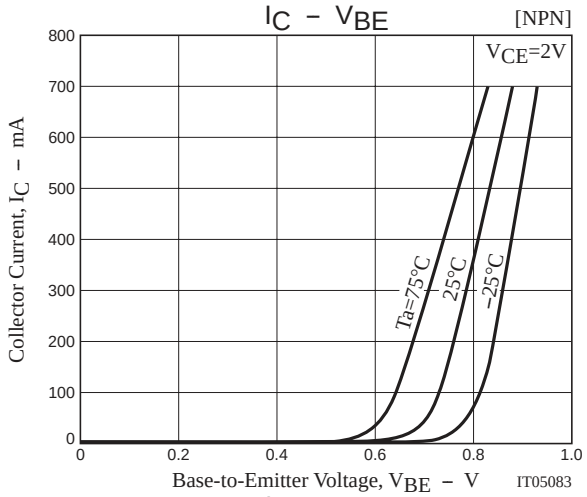
$20I_{B1} = -20I_{B2} = I_C = 300mA$

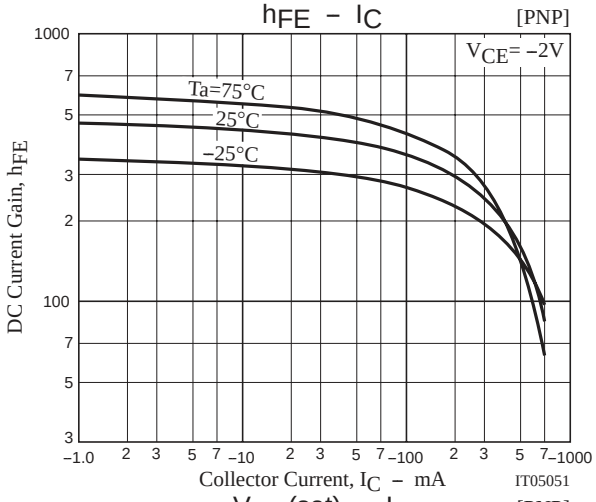
For PNP, minus sign is omitted.

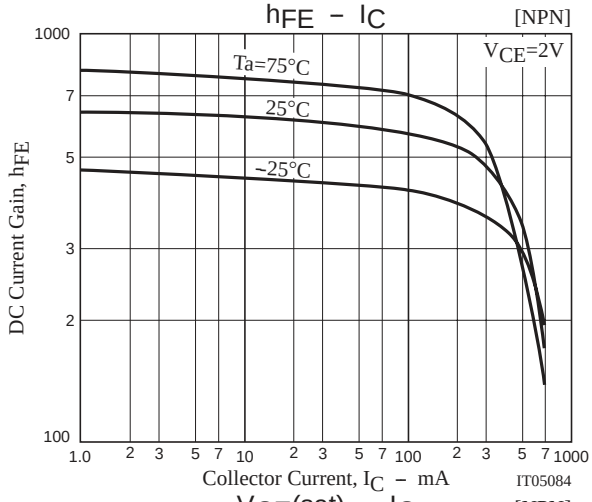


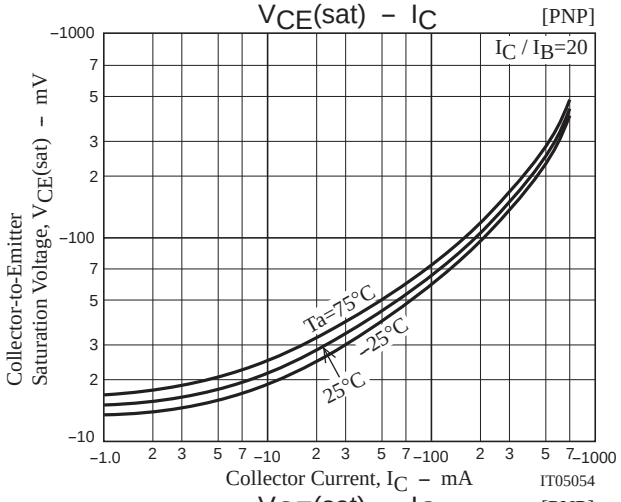


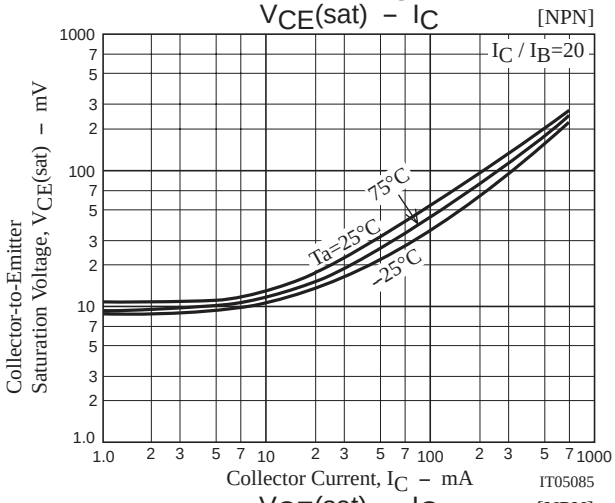

IC – VBE
[PNP]
VCE= –2V
Collector Current, IC – mA
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
IT05050

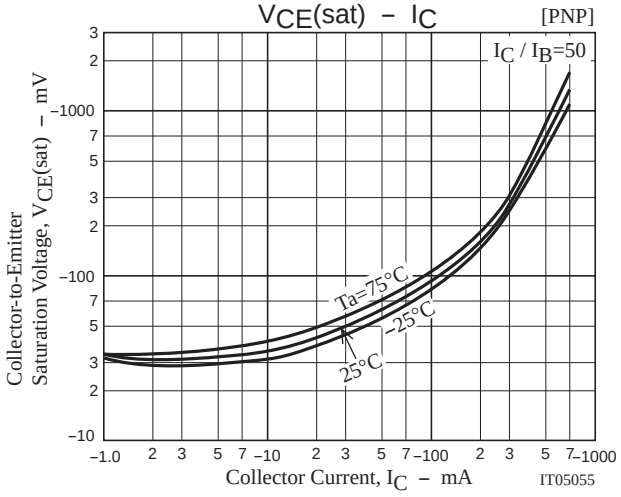

IC – VBE
[NPN]
VCE=2V
Collector Current, IC – mA
Base-to-Emitter Voltage, VBE – V
Ta=75°C
25°C
–25°C
IT05083

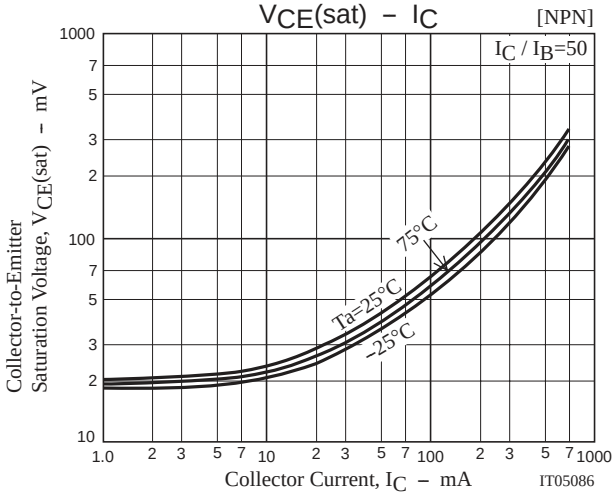

hFE – IC
[PNP]
VCE= –2V
DC Current Gain, hFE
Collector Current, IC – mA
Ta=75°C
25°C
–25°C
IT05051

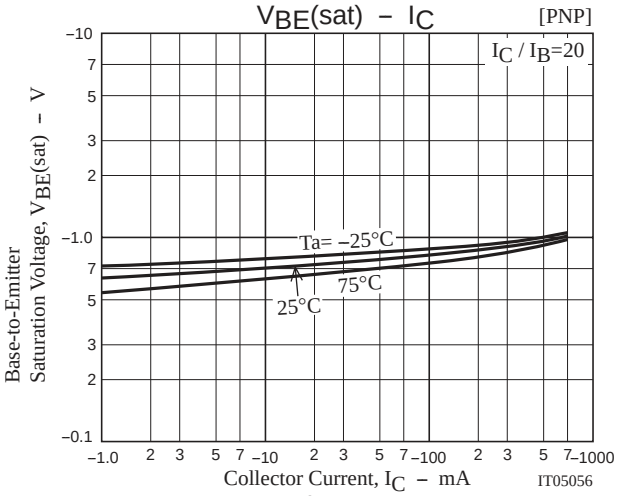

hFE – IC
[NPN]
VCE=2V
DC Current Gain, hFE
Collector Current, IC – mA
Ta=75°C
25°C
–25°C
IT05084

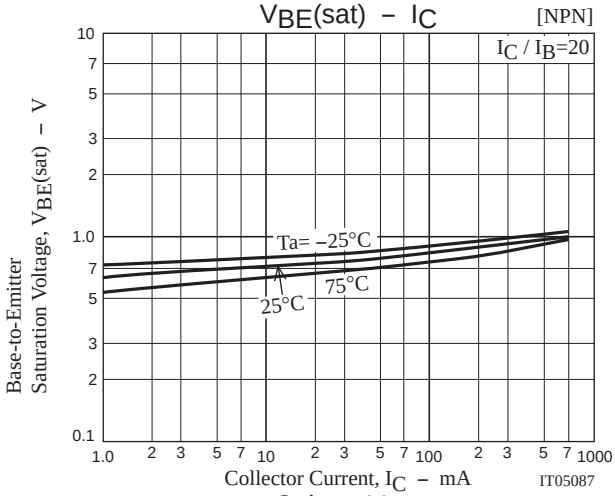

VCE(sat) – IC
[PNP]
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
Ta=75°C
–25°C
25°C
IT05054

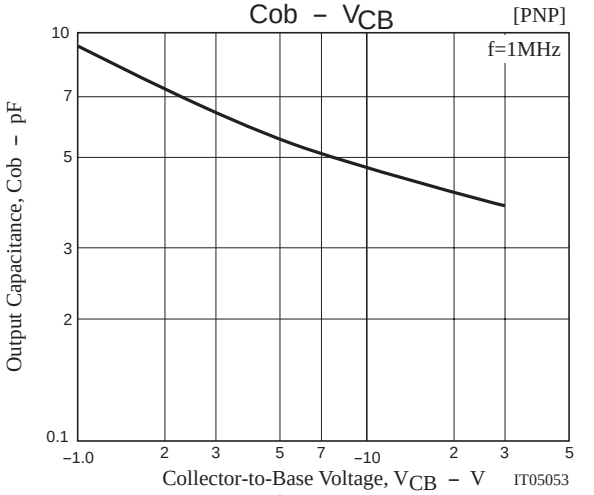

VCE(sat) – IC
[NPN]
IC / IB=20
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
75°C
Ta=25°C
–25°C
IT05085

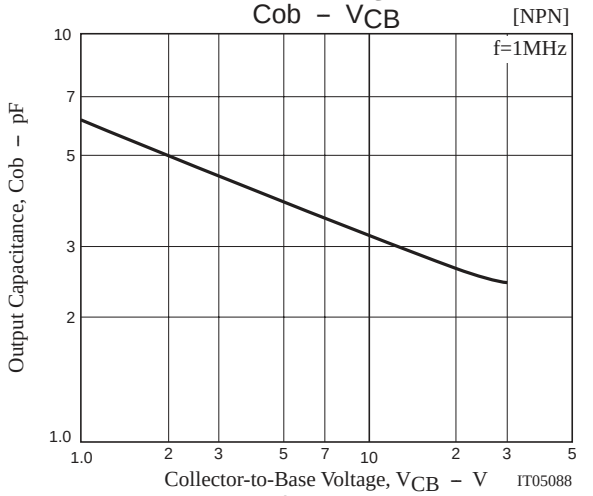

VCE(sat) – IC
[PNP]
IC / IB=50
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
Ta=75°C
–25°C
25°C
IT05055

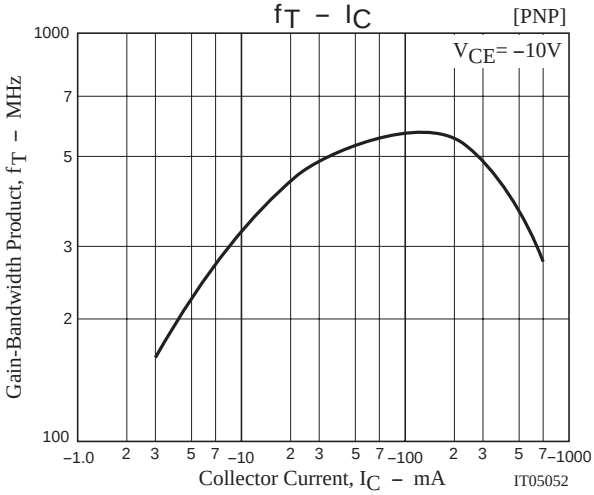

VCE(sat) – IC
[NPN]
IC / IB=50
Collector-to-Emitter Saturation Voltage, VCE(sat) – mV
Collector Current, IC – mA
75°C
Ta=25°C
–25°C
IT05086

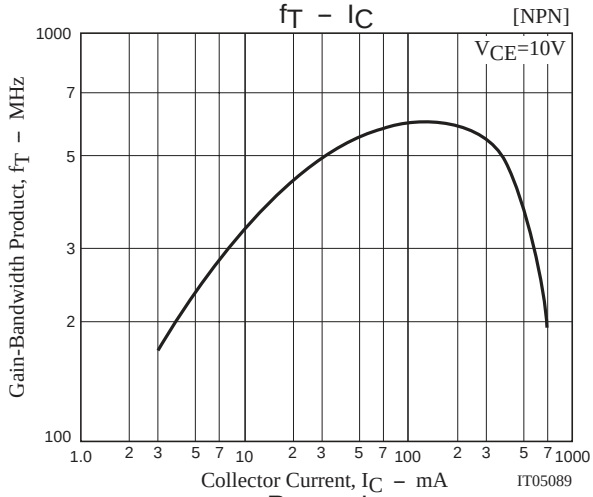

VBE(sat) – IC
[PNP]
IC / IB=20
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – mA
IT05056

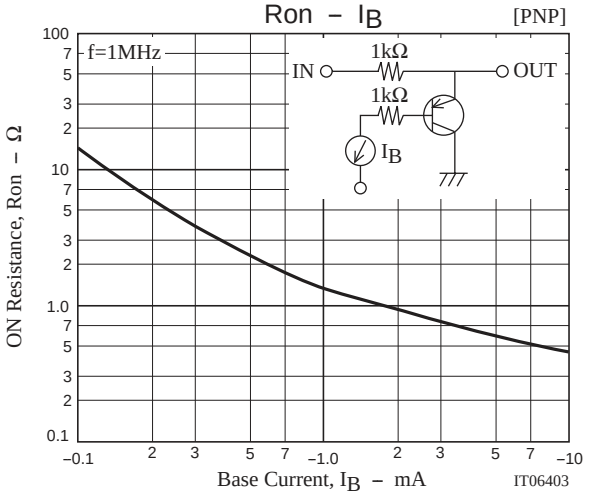

VBE(sat) – IC
[NPN]
IC / IB=20
Ta= –25°C
75°C
25°C
Base-to-Emitter Saturation Voltage, VBE(sat) – V
Collector Current, IC – mA
IT05087

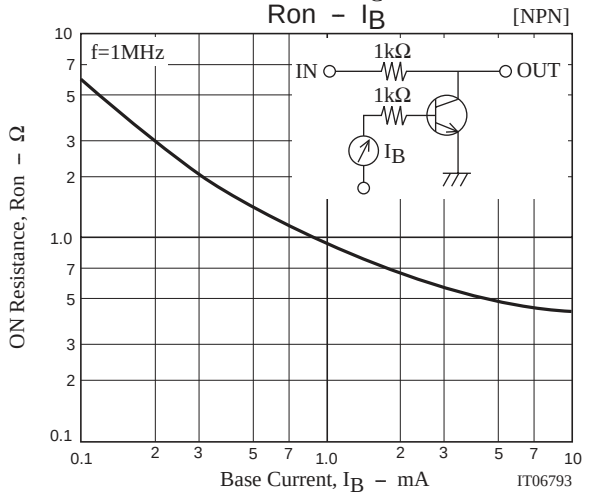

Cob – VCB
[PNP]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT05053


Cob – VCB
[NPN]
f=1MHz
Output Capacitance, Cob – pF
Collector-to-Base Voltage, VCB – V
IT05088


fT – IC
[PNP]
VCE= –10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT05052


fT – IC
[NPN]
VCE=10V
Gain-Bandwidth Product, fT – MHz
Collector Current, IC – mA
IT05089


Ron – IB
[PNP]
f=1MHz
IN
1kΩ
1kΩ
OUT
IB
ON Resistance, Ron – Ω
Base Current, IB – mA
IT06403


Ron – IB
[NPN]
f=1MHz
IN
1kΩ
1kΩ
OUT
IB
ON Resistance, Ron – Ω
Base Current, IB – mA
IT06793