



**CHENMKO ENTERPRISE CO.,LTD**

*Lead free devices*

**SURFACE MOUNT  
PNP&NPN Multi-Chip General Purpose Transistor**

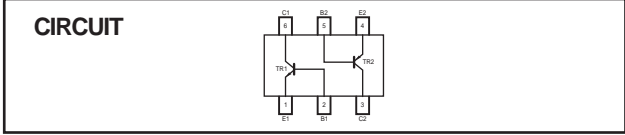
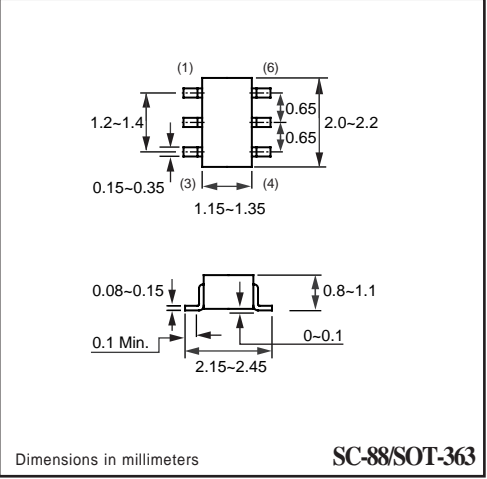
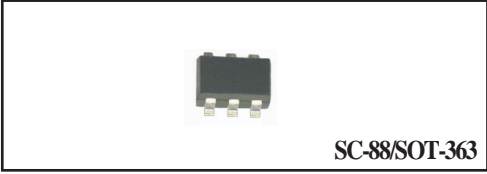
VOLTAGE 40 Volts CURRENT 600 mAmpere

**CHT4413UPNPT**

**APPLICATION**  
 \* AF input stages and driver applicationon equipment.  
 \* Other general purpose applications.

**FEATURE**  
 \* Small surface mounting type. (SC-88/SOT-363)  
 \* High current gain.  
 \* Suitable for high packing density.  
 \* Low collector-emitter saturation.  
 \* High saturation current capability.  
 \* Two internal isolated PNP and NPN transistors in one package.

**CONSTRUCTION**  
 \* PNP and NPN transistors in one package.



**TR1 CHT4401 LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>CBO</sub>	collector-base voltage	open emitter	-	60	V
V <sub>CEO</sub>	collector-emitter voltage	open base	-	40	V
V <sub>EBO</sub>	emitter-base voltage	open collector	-	6	V
I <sub>C</sub>	collector current (DC)		-	600	mA
P <sub>tot</sub>	total power dissipation	T <sub>amb</sub> ≤ 25 °C; note 1	-	200	mW
T <sub>stg</sub>	storage temperature		-65	+150	°C
T <sub>j</sub>	junction temperature		-	150	°C
T <sub>amb</sub>	operating ambient temperature		-65	+150	°C

**Note**

1. Transistor mounted on an FR4 printed-circuit board.

## TR2 CHT4403 LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	-40	V
$V_{CEO}$	collector-emitter voltage	open base	–	-40	V
$V_{EBO}$	emitter-base voltage	open collector	–	-5	V
$I_C$	collector current (DC)		–	-600	mA
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$ ; note 2	–	200	mW
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		–	150	°C
$T_{amb}$	operating ambient temperature		-65	+150	°C

### Note

2. Transistor mounted on an FR4 printed-circuit board.

## TR1 CHT4401 CHARACTERISTICS

$T_{amb} = 25\text{ °C}$  unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\mu\text{A}$ ; $I_E = 0\text{A}$	60	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 1\text{mA}$ ; $I_B = 0\text{A}$	40	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\mu\text{A}$ ; $I_C = 0\text{A}$	6	–	V
$I_{CEX}$	collector cut-off current	$V_{EB(OFF)} = 0.4\text{V}$ ; $V_{CE} = 35\text{V}$	–	100	nA
$I_{BL}$	base cut-off current	$V_{EB(OFF)} = 0.4\text{V}$ ; $V_{CE} = 35\text{V}$	–	100	nA
$h_{FE}$	DC current gain	$I_C = 100\mu\text{A}$ ; $V_{CE} = 1\text{V}$	20	–	
		$I_C = 1\text{mA}$ ; $V_{CE} = 1\text{V}$	40	–	
		$I_C = 10\text{mA}$ ; $V_{CE} = 1\text{V}$	80	–	
		$I_C = 150\text{mA}$ ; $V_{CE} = 1\text{V}$	100	300	
		$I_C = 500\text{mA}$ ; $V_{CE} = 2\text{V}$	40	–	
$V_{CEsat}$	collector-emitter saturation	$I_C = 150\text{mA}$ ; $I_B = 15\text{mA}$	–	400	mV
		$I_C = 500\text{mA}$ ; $I_B = 50\text{mA}$	–	750	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = 150\text{mA}$ ; $I_B = 15\text{mA}$	750	950	mV
		$I_C = 500\text{mA}$ ; $I_B = 50\text{mA}$	–	1200	mV
$C_{cb}$	output capacitance	$V_{CB} = 5.0\text{V}$ ; $f = 1.0\text{MHz}$ ; $I_E = 0$	–	6.5	pF
$C_{eb}$	input capacitance	$V_{EB} = 0.5\text{V}$ ; $f = 1.0\text{MHz}$ ; $I_C = 0$	–	30	pF
$h_{ie}$	input impedance	$V_{CE} = 10\text{V}$ ; $f = 1.0\text{KHz}$ ; $I_C = 1.0\text{mA}$	1.0	15	$\text{K}\Omega$
$h_{re}$	voltage feedback ratio		0.1	8.0	$\times 10^{-4}$
$h_{fe}$	small signal current gain		40	500	
$h_{oe}$	output impedance		1.0	30	$\mu\text{S}$
$f_T$	transition frequency		$I_C = 20\text{mA}$ ; $V_{CE} = 10\text{V}$ ; $f = 100\text{MHz}$	250	–
$t_d$	delay time	$V_{CC} = 30\text{V}$ ; $I_C = 150\text{mA}$	–	15	nS
$t_r$	rise time	$V_{BE(off)} = 2.0\text{V}$ ; $I_{B1} = 15\text{mA}$	–	20	nS
$t_s$	storage time	$V_{CC} = 30\text{V}$ ; $I_C = 150\text{mA}$	–	225	nS
$t_f$	fall time	$I_{B1} = I_{B2} = 15\text{mA}$	–	30	nS

## TR2 CHT4403 CHARACTERISTICS

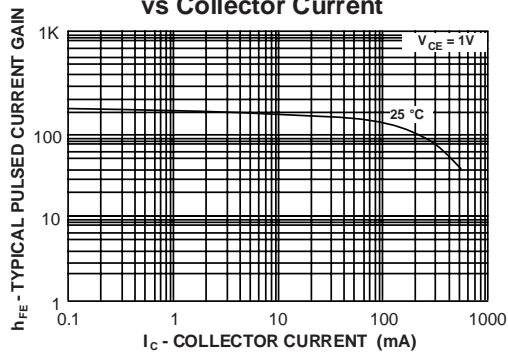
T<sub>amb</sub> = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V <sub>(BR)CBO</sub>	collector-base breakdown voltage	I <sub>C</sub> = -100uA ; I <sub>E</sub> = 0A	-40	–	V
V <sub>(BR)CEO</sub>	collector-emitter breakdown voltage	I <sub>C</sub> = -1mA ; I <sub>B</sub> = 0A	-40	–	V
V <sub>(BR)EBO</sub>	emitter-base breakdown voltage	I <sub>E</sub> = -100uA ; I <sub>C</sub> = 0A	-6	–	V
I <sub>CEX</sub>	collector cut-off current	V <sub>EB(OFF)</sub> = -0.4V ; V <sub>CE</sub> = -35 V	–	-100	nA
I <sub>BL</sub>	base cut-off current	V <sub>EB(OFF)</sub> = -0.4V ; V <sub>CE</sub> = -35 V	–	-100	nA
h <sub>FE</sub>	DC current gain	I <sub>C</sub> = -100uA; V <sub>CE</sub> = -1V	30	–	
		I <sub>C</sub> = -1 mA; V <sub>CE</sub> = -1V	60	–	
		I <sub>C</sub> = -10 mA; V <sub>CE</sub> = -1V	100	–	
		I <sub>C</sub> = -150 mA; V <sub>CE</sub> = -2V	100	300	
		I <sub>C</sub> = -500 mA; V <sub>CE</sub> = -2V	20	–	
V <sub>CEsat</sub>	collector-emitter saturation	I <sub>C</sub> = -150 mA; I <sub>B</sub> = -15 mA	–	-400	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA	–	-750	mV
V <sub>BEsat</sub>	base-emitter saturation voltage	I <sub>C</sub> = -150 mA; I <sub>B</sub> = -15 mA	-750	-950	mV
		I <sub>C</sub> = -500 mA; I <sub>B</sub> = -50 mA	–	-1300	mV
C <sub>cb</sub>	output capacitance	V <sub>CB</sub> =-10V; f=1.0MHZ; I <sub>E</sub> =0	–	8.5	pF
C <sub>eb</sub>	input capacitance	V <sub>EB</sub> =-0.5V; f=1.0MHZ; I <sub>C</sub> =0	–	30	pF
h <sub>ie</sub>	input impedance	V <sub>CE</sub> =-10V; f=1.0KHZ; I <sub>C</sub> =-1.0mA	1.5	15	KΩ
h <sub>re</sub>	voltage feedback ratio		0.1	8.0	x10 <sup>-4</sup>
h <sub>fe</sub>	small signal current gain		60	500	
h <sub>oe</sub>	output impedance		1.0	100	μS
f <sub>T</sub>	transition frequency		I <sub>C</sub> = -20 mA; V <sub>CE</sub> = - 10 V f = 100 MHz	200	–
t <sub>d</sub>	delay time	V <sub>CC</sub> =-30V; I <sub>C</sub> =-150mA	–	15	nS
t <sub>r</sub>	rise time	V <sub>BE(off)</sub> =-2.0V; I <sub>B1</sub> =-15mA	–	20	nS
t <sub>s</sub>	storage time	V <sub>CC</sub> =-30V; I <sub>C</sub> =-150mA	–	225	nS
t <sub>f</sub>	fall time	I <sub>B1</sub> =I <sub>B2</sub> =-15mA	–	30	nS

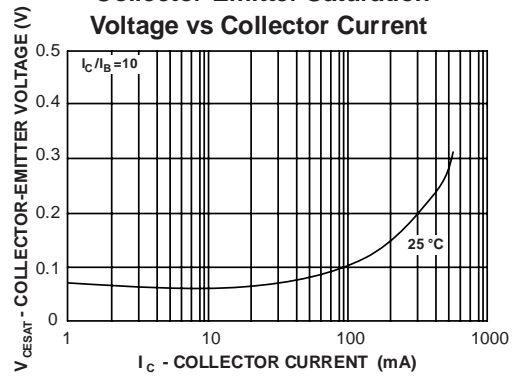
## RATING CHARACTERISTIC CURVES ( CHT4413UPNPT )

### TR1 CHT4401 Typical Characteristics

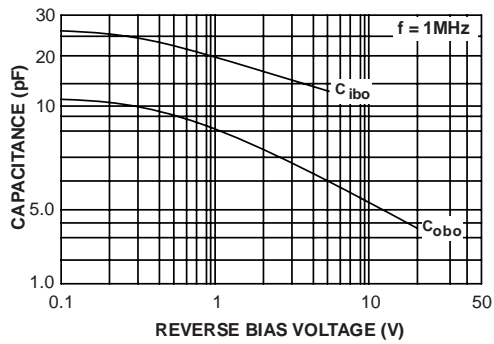
**Typical DC Current Gain vs Collector Current**



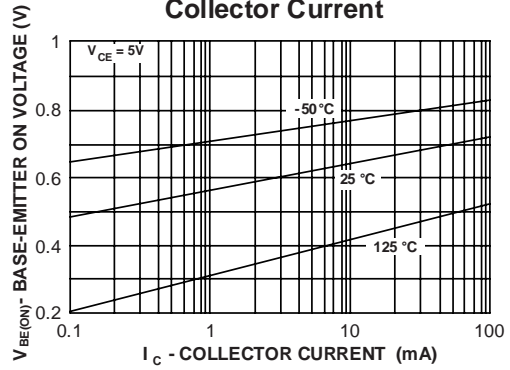
**Collector-Emitter Saturation Voltage vs Collector Current**



**Typical Capacitance**



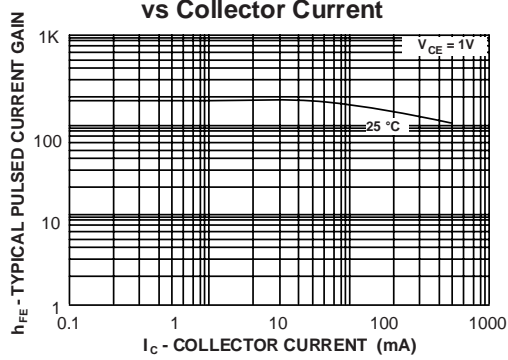
**Base-Emitter ON Voltage vs Collector Current**



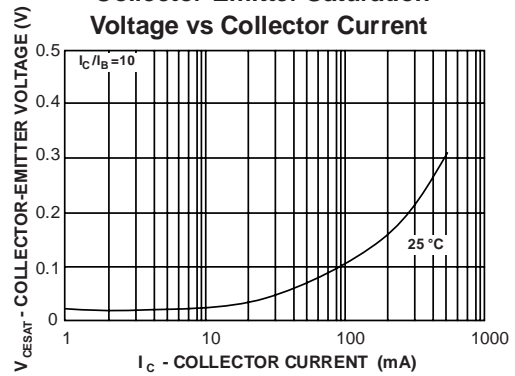
## RATING CHARACTERISTIC CURVES ( CHT4413UPNPT )

TR1 CHT4403 Typical Characteristics

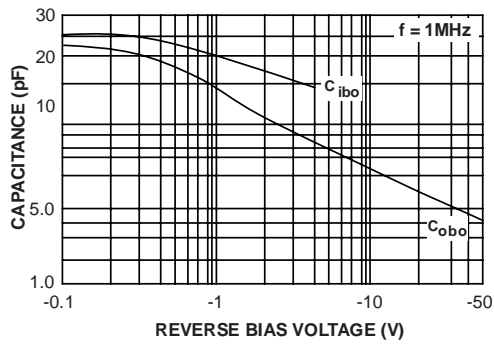
**Typical DC Current Gain  
vs Collector Current**



**Collector-Emitter Saturation  
Voltage vs Collector Current**



**Typical Capacitance**



**Base-Emitter ON Voltage vs  
Collector Current**

