N- Channel Enhancement mode MOSFET AND PNP BJT Complex Device

MBNP2074G6

Description

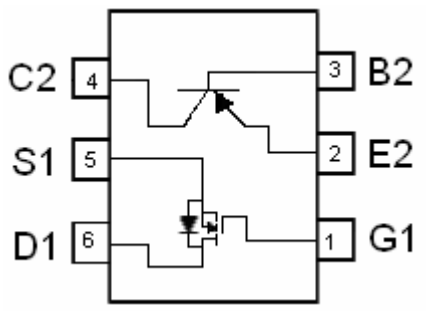
The MBNP2074G6 consists of a N-channel enhancement-mode MOSFET and a PNP BJT in a single TSOP-6 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.
The TSOP-6 package is universally preferred for all commercial-industrial surface mount applications.

Features

- Simple drive requirement
- Low gate charge
- Low on-resistance
- Fast switching speed
- Pb-free package

Equivalent Circuit

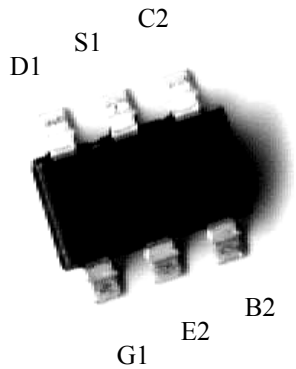
MBNP2074G6



G：Gate B : Base
S：Source E : Emitter
D：Drain C : Collector

Outline

TSOP-6



Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits		Unit
		N-channel	PNP	
Drain-Source Breakdown Voltage	BV_{DSS}	30		V
Gate-Source Voltage	V_{GS}	±12		V
Collector-Base Voltage	V_{CBO}		-50	V
Collector-Emitter Voltage	V_{CEO}		-30	V
Emitter-Base Voltage	V_{EBO}		-7	V
Continuous Drain Current (Note 1)	I_D	100		mA
Pulsed Drain Current (Note 2)	I_{DM}	400		mA
Collector Current(DC) (Note 1)	I_C		-1.5	A
Peak Collector Current (Note 2)	I_{CM}		-3	A
Peak Base Current (Note 2)	I_{BM}		-300	mA
Total Power Dissipation (Note 1)	Pd	1.14		W
Linear Derating Factor		0.01		W / °C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	110		°C/W

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤5 sec; 180°C/W when mounted on minimum copper pad
2.Pulse width limited by maximum junction temperature

N-Channel MOSFET Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0, I_D=100μA
$V_{GS(th)}$	0.8	1.3	1.5	V	V_{DS}=3V, I_D=100μA
I_{GSS}	-	-	±1	μA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	100	nA	V_{DS}=30V, V_{GS}=0
$R_{DS(ON)}$	-	3.4	8	Ω	V_{GS}=4V, I_D=10mA
	-	6.9	13		V_{GS}=2.5V, I_D=1mA
G_{FS}	20	50	-	mS	V_{DS}=3V, I_D=10mA
Dynamic					
Ciss	-	12.5	-	pF	V_{DS}=5V, V_{GS}=0, f=1MHz
Coss	-	7.3	-		
Crss	-	3.5	-		
*$t_{d(ON)}$	-	15	-	ns	V_{DD}≒5V, I_D=10mA, V_{GS}=5V, R_L=500Ω, R_G=10Ω
*t_r	-	35	-		
*$t_{d(OFF)}$	-	75	-		
*t_f	-	75	-		
Rg	-	1.1	1.7	Ω	f=1MHz
Source-Drain Diode					
*V_{SD}	-	0.88	1.2	V	V_{GS}=0V, I_S=100mA

*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

PNP BJT Electrical Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-50	-	-	V	I_C=-50μA, I_E=0
BV_{CEO}	-30	-	-	V	I_C=-1mA, I_B=0
BV_{EBO}	-7	-	-	V	I_E=-50μA, I_C=0
I_{CBO}	-	-	-100	nA	V_{CB}=-50V, I_E=0
I_{EBO}	-	-	-100	nA	V_{EB}=-7V, I_C=0
*$V_{CE(sat)}$	-	-0.24	-0.4	V	I_C=-500mA, I_B=-20mA
*$V_{CE(sat)}$	-	-	-0.5	V	I_C=-800mA, I_B=-80mA
*$V_{BE(on)}$	-0.5	-	-0.8	V	V_{CE}=-1V, I_C=-10mA
*h_{FE} 1	120	-	390	-	V_{CE}=-1V, I_C=-100mA
*h_{FE} 2	40	-	-	-	V_{CE}=-1V, I_C=-800mA
f_T	-	150	-	MHz	V_{CE}=-5V, I_C=-10mA, f=100MHz
Cob	-	12	-	pF	V_{CB}=-10V, f=1MHz

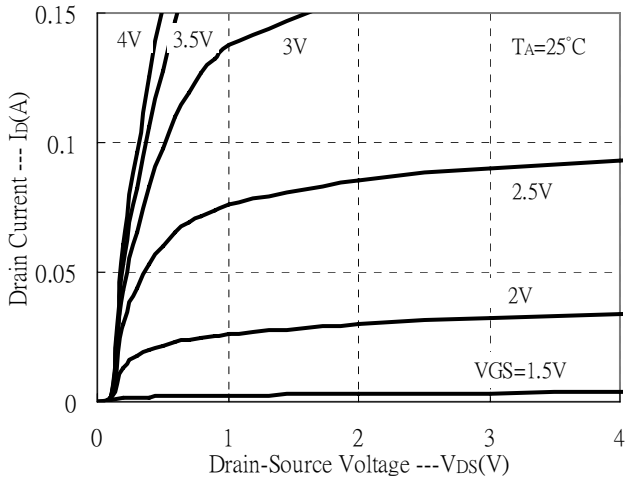
*Pulse Test : Pulse Width ≤380μs, Duty Cycle≤2%

Ordering Information

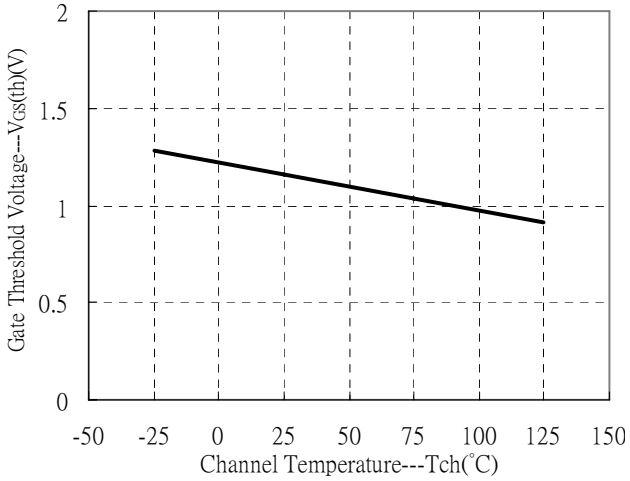
Device	Package	Shipping	Marking
MBNP2074G6	TSOP-6 (Pb-free lead plating & halogen-free package)	3000 pcs / Tape & Reel	2074

N-channel MOSFET Characteristic Curves

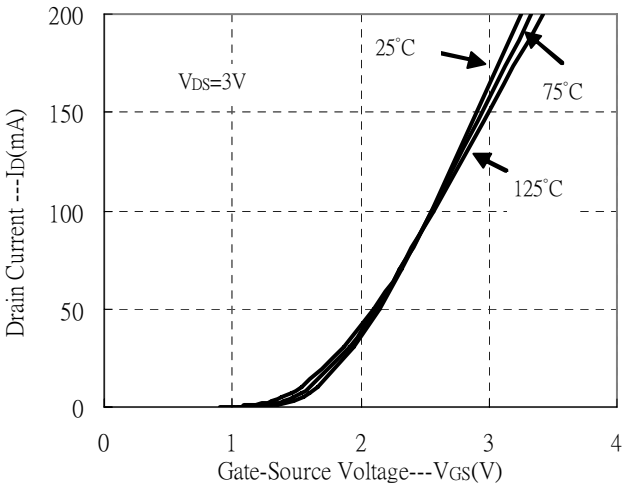
Typical Output Characteristics



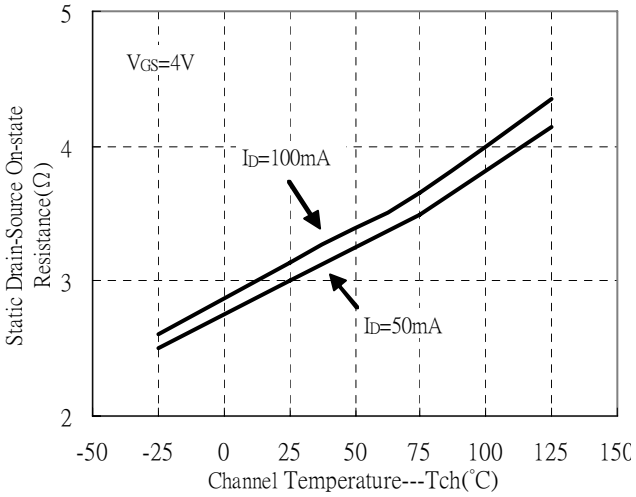
Gate Threshold Voltage vs Channel Temperature



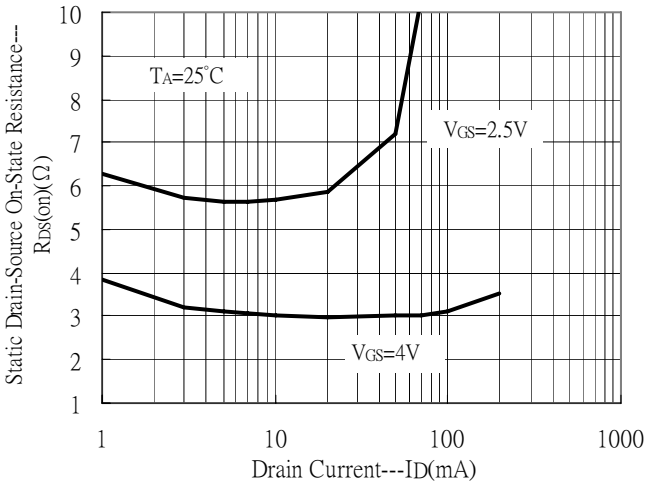
Typical Transfer Characteristics



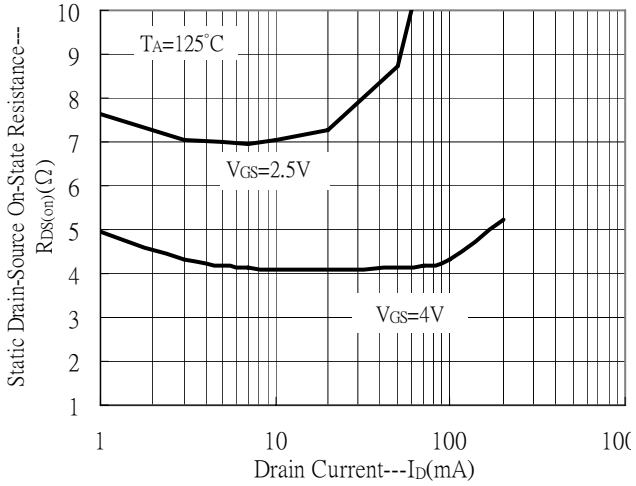
Static Drain-Source On-state Resistance with Temperature



Static Drain-Source On-State resistance vs Drain Current

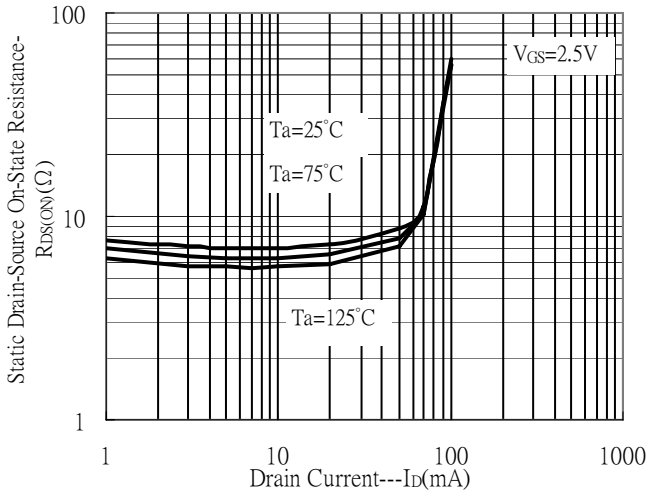


Static Drain-Source On-State resistance vs Drain Current

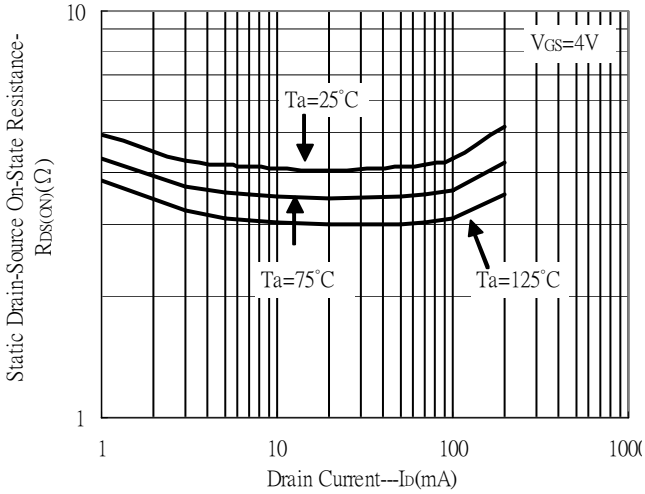


N-channel MOSFET Characteristic Curves(Cont.)

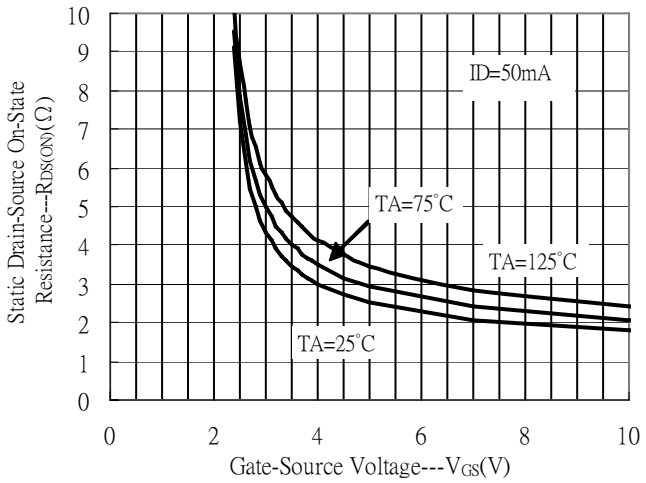
Static Drain-Source On-State Resistance vs Drain Current



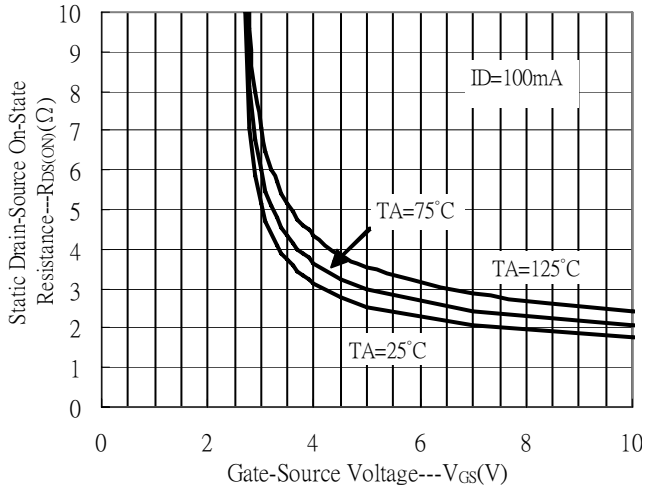
Static Drain-Source On-State Resistance vs Drain Current



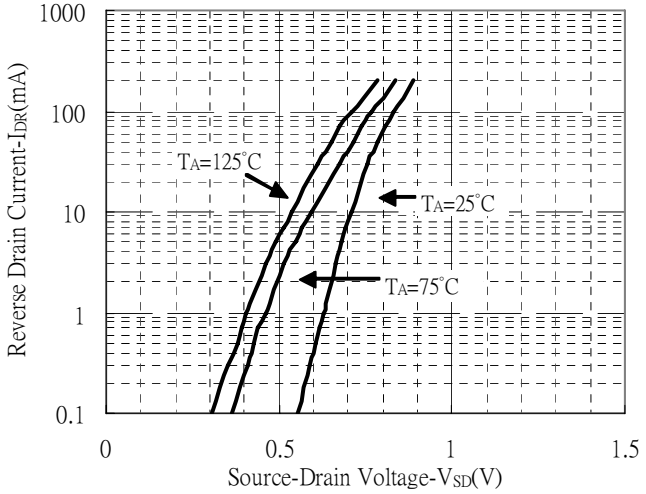
Static Drain-Source On-State Resistance vs Gate-Source Voltage



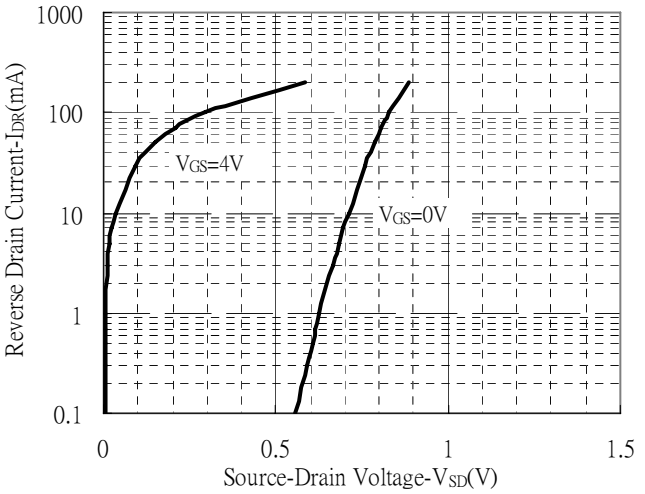
Static Drain-Source On-State Resistance vs Gate-Source Voltage



Reverse Drain Current vs Source-Drain Voltage(I)

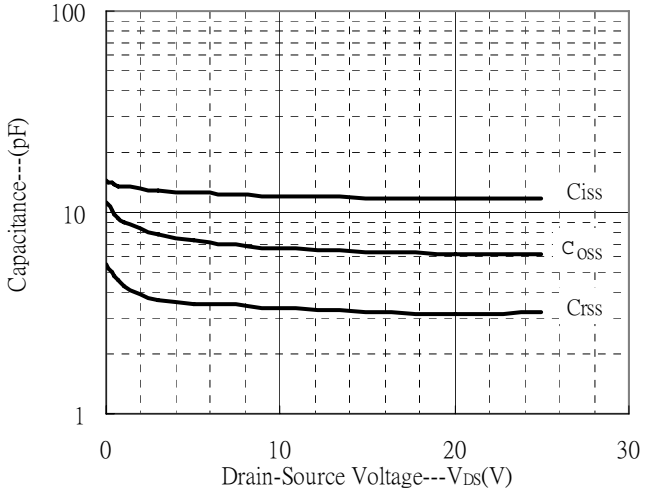


Reverse Drain Current vs Source-Drain Voltage(II)

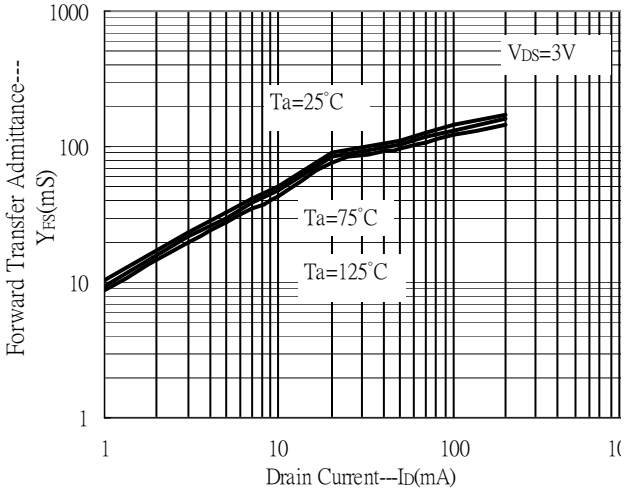


N-channel MOSFET Characteristic Curves(Cont.)

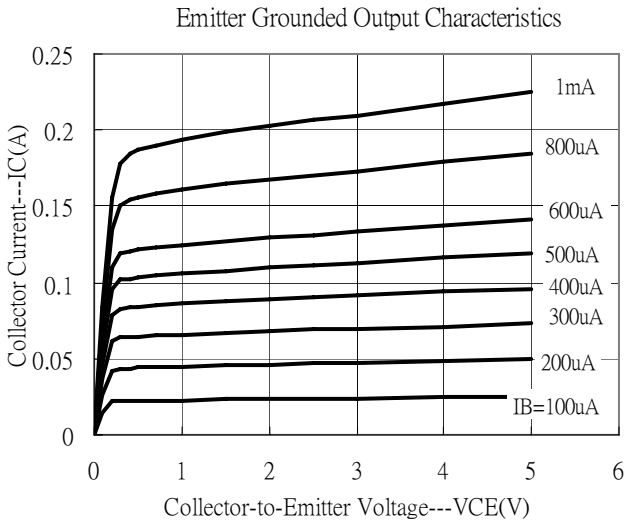
Capacitance vs Drain-to-Source Voltage

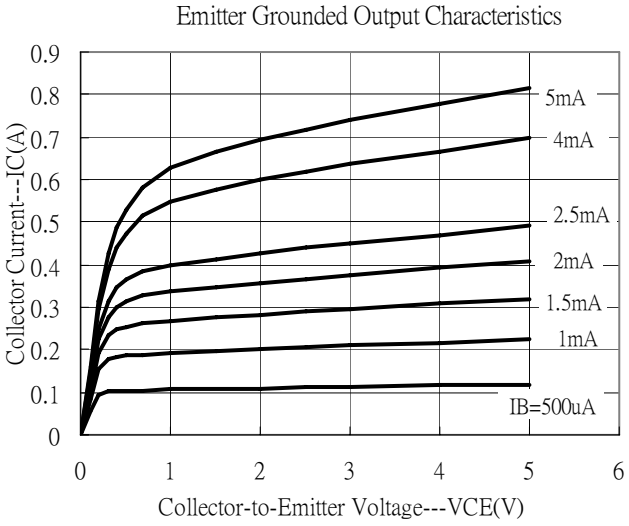


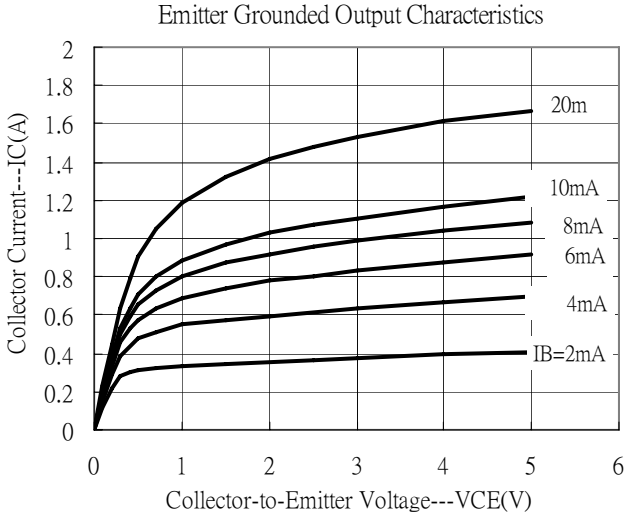
Foreward Transfer Admittance vs Drain Current

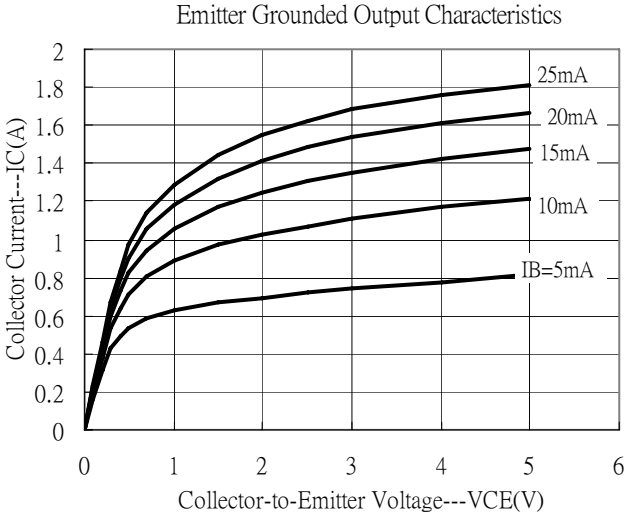


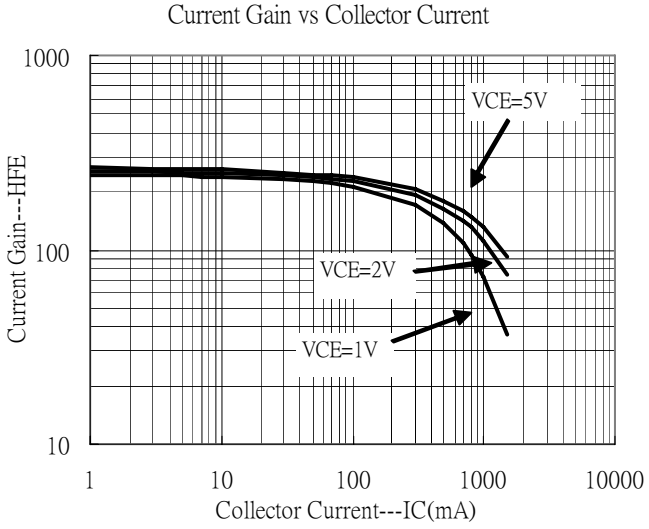
PNP BJT Characteristic Curves

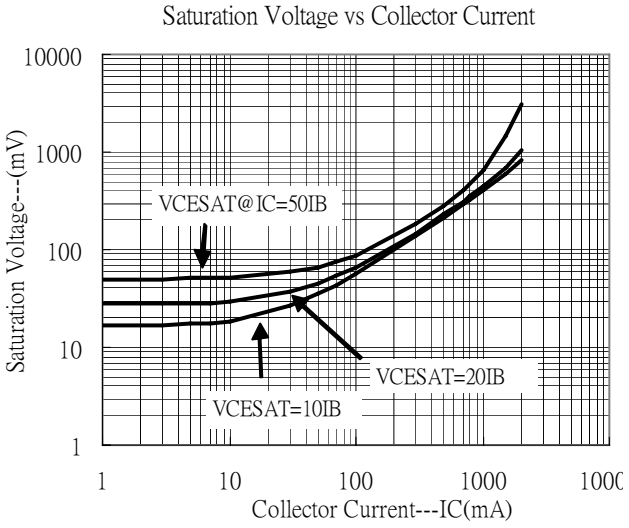




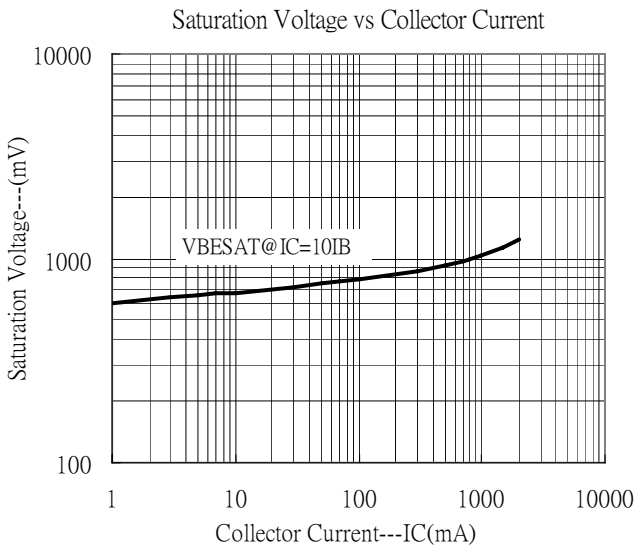


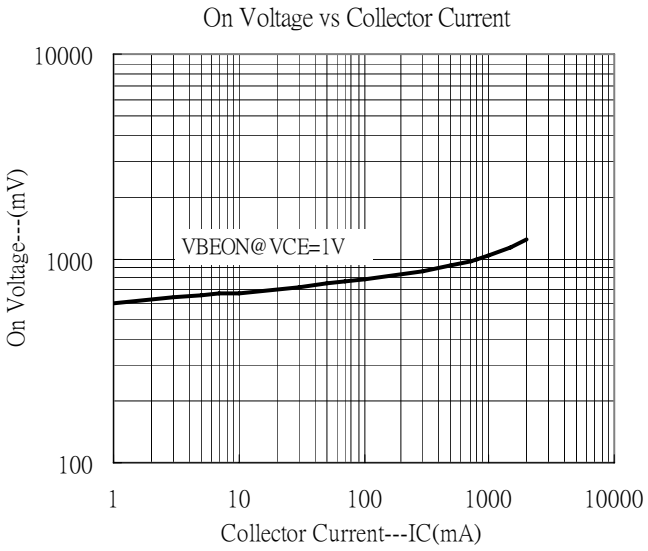


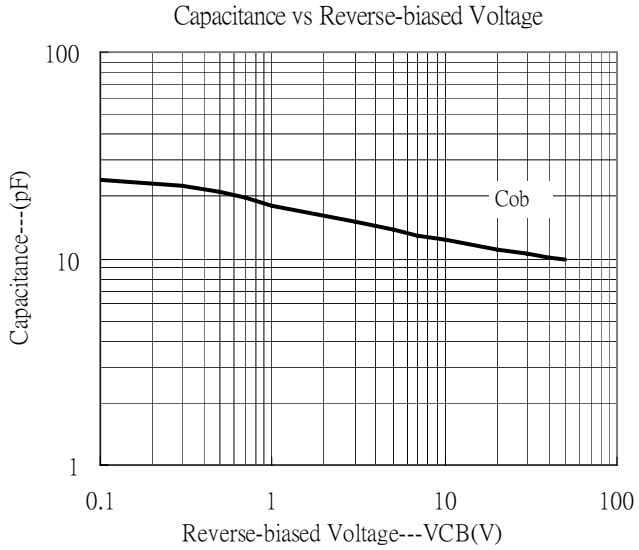


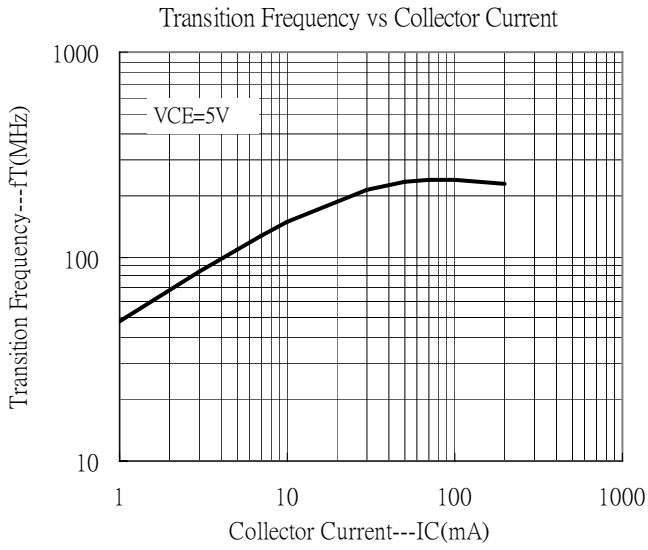


PNP BJT Characteristic Curves (Cont.)





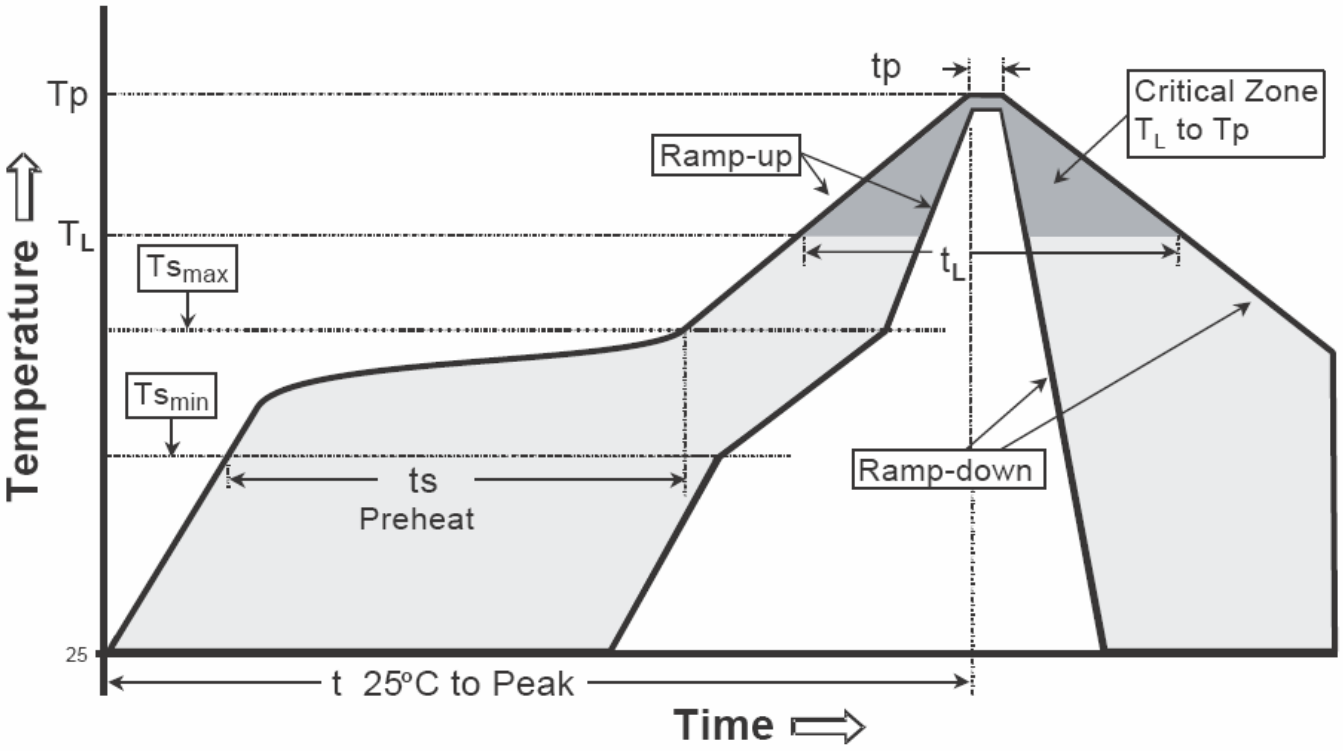




Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

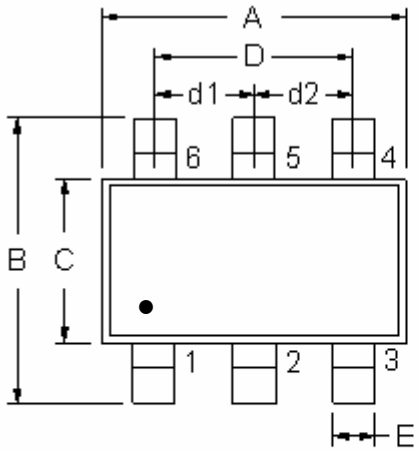
Recommended temperature profile for IR reflow



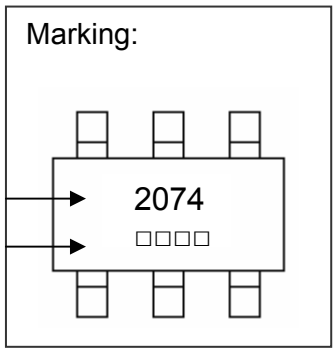
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(T_P)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

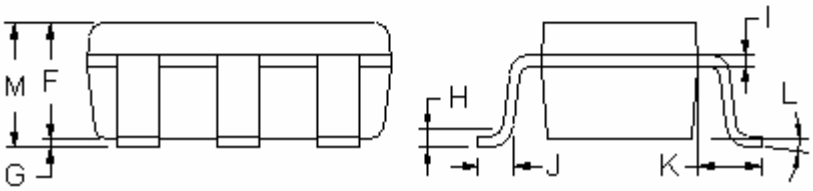
Note : All temperatures refer to topside of the package, measured on the package body surface.

TSOP-6 Dimension



Style:
Pin 1. Gate1 (G1)
Pin 2. Emitter2 (E2)
Pin 3. Base2 (B2)
Pin 4. Collector2 (C2)
Pin 5. Source1 (S1)
Pin 6. Drain1 (D1)





6-Lead TSOP-6 Plastic
Surface Mounted Package
CYStek Package Code: G6

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1063	0.1220	2.70	3.10	G	0	0.0039	0	0.10
B	0.1024	0.1181	2.60	3.00	H	-	0.0098	-	0.25
C	0.0551	0.0709	1.40	1.80	I	0.0047 REF		0.12 REF	
D	0.0748 REF		1.90 REF		J	0.0177 REF		0.45 REF	
d1	0.0374 REF		0.95 REF		K	0.0236 REF		0.60 REF	
d2	0.0374 REF		0.95 REF		L	0°	10°	0°	10°
E	0.0118	0.0197	0.30	0.50	M	-	0.0433	-	1.10
F	0.0276	0.0394	0.70	1.00					

Notes : 1.Controlling dimension : millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material :

- Lead : Pure tin plated.
- Mold Compound : Epoxy resin family, flammability solid burning class:UL94V-0.