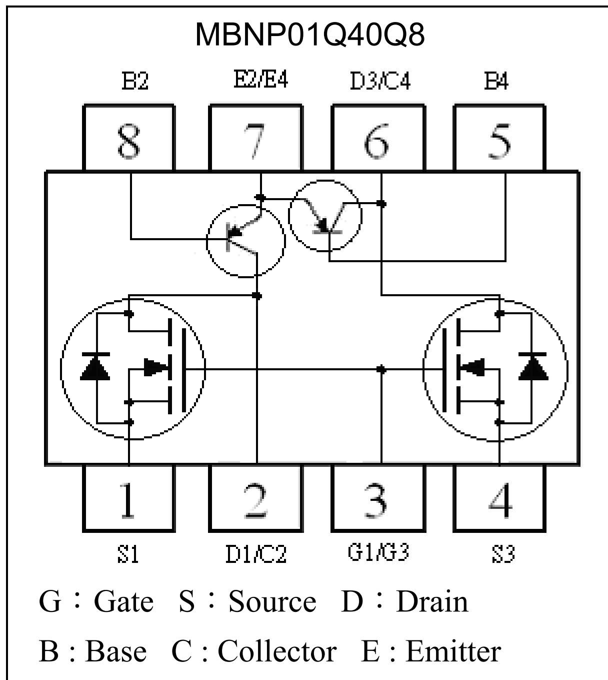
Complex Transistors

MBNP01Q40Q8

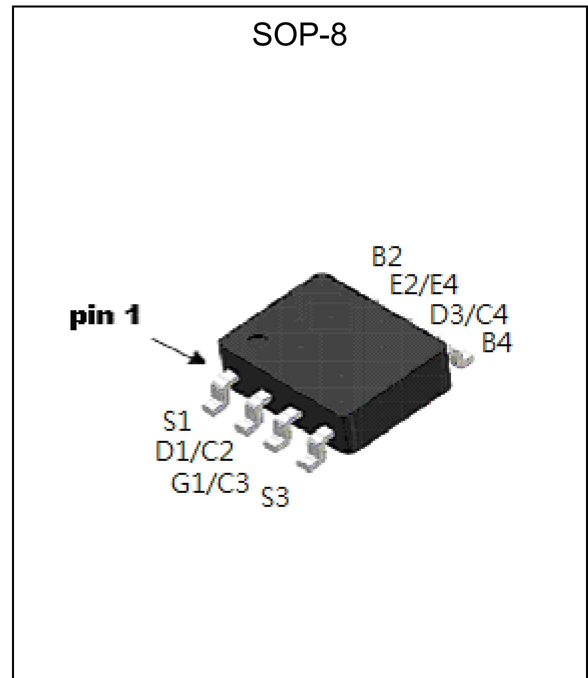
Features

- Two PNP and two NMOS chips are assembled in a standard SOP-8 package
- Mounting area could be greatly reduced.
- Pb-free lead plating and halogen-free package

Equivalent Circuit

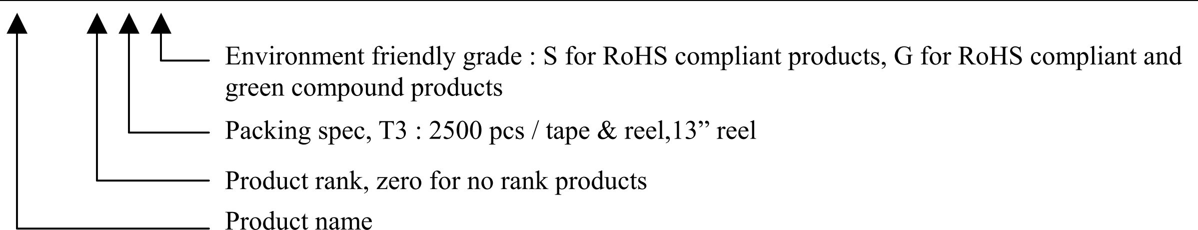


Outline



Ordering Information

Device	Package	Shipping
MBNP01Q40Q8-0-T3-G	SOP-8 (Pb-free lead plating & halogen-free package)	2500 pcs / Tape & Reel



Absolute Maximum Ratings (Tc=25°C, unless otherwise noted)

NMOS

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	400	V
Gate-Source Voltage	V_{GS}	±12	
Continuous Drain Current @ T_A=25°C, V_{GS}=10V (Note 2)	I_D	0.36	A
Continuous Drain Current @ T_A=70°C, V_{GS}=10V (Note 2)		0.29	
Pulsed Drain Current (Note 1)	I_{DM}	5.2	
Maximum Power Dissipation @ T_A=25℃ (Note 2)	P_D	1.6	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C

PNP

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	-400	V
Collector-Emitter Voltage	V_{CEO}	-400	
Emitter-Base Voltage	V_{EBO}	-5	
Collector Current	I_C	-300	mA
Total Power Dissipation	P_D	1.5	W
Linear Derating Factor		0.01	W/°C
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150	°C

Thermal Data

Parameter	Symbol	Value		Unit
		NMOS	PNP	
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	6		°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	70 (Note 2)	83 (Note 2)	

Note : 1.Pulse width limited by maximum junction temperature.
2.Surface mounted on 1 in² copper pad of FR-4 board, pulse width≤10s.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	400	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1.0	-	2.5	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±3V, V_{DS}=0V
	-	-	±10	μA	V_{GS}=±12V, V_{DS}=0V
I_{DSS}	-	-	100	nA	V_{DS}=320V, V_{GS}=0V
	-	-	10	μA	V_{DS}=320V, V_{GS}=0V, Tj=125°C
*$R_{DS(ON)}$	-	4.2	5.5	Ω	V_{GS}=10V, I_D=100mA
	-	4.2	5.5		V_{GS}=4.5V, I_D=100mA
*G_{FS}	-	300	-	mS	V_{DS}=10V, I_D=30mA
Dynamic					
Ciss	-	173	-	pF	V_{DS}=30V, V_{GS}=0V, f=1MHz
Coss	-	20	-		
Crss	-	19	-		
*$t_{d(ON)}$	-	3.4	-	ns	V_{DS}=200V, I_D=1A, V_{GS}=10V, R_G=6Ω
*t_r	-	5.8	-		
*$t_{d(OFF)}$	-	10.6	-		
*t_f	-	23.4	-		
*Qg	-	7.5	-	nC	V_{DS}=320V, I_D=100mA, VGS=10V
*Qgs	-	0.7	-		
*Qgd	-	3.2	-		
Body Diode					
*I_S	-	-	0.36	A	
*I_{SM}	-	-	5.2		
*V_{SD}	-	0.72	1	V	V_{GS}=0V, I_S=100mA
*trr	-	96	-	ns	I_F=0.5A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	67	-	nC	

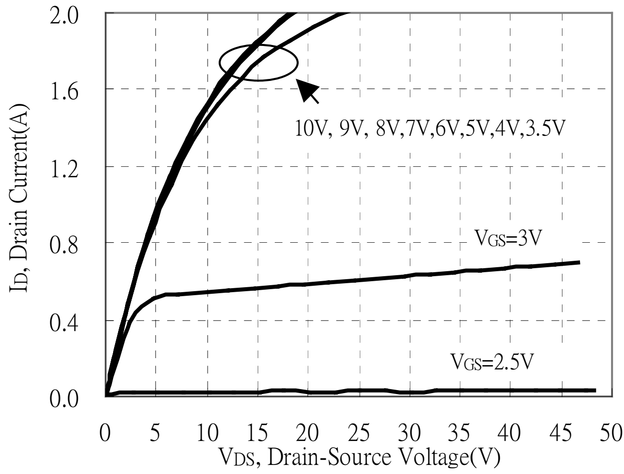
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

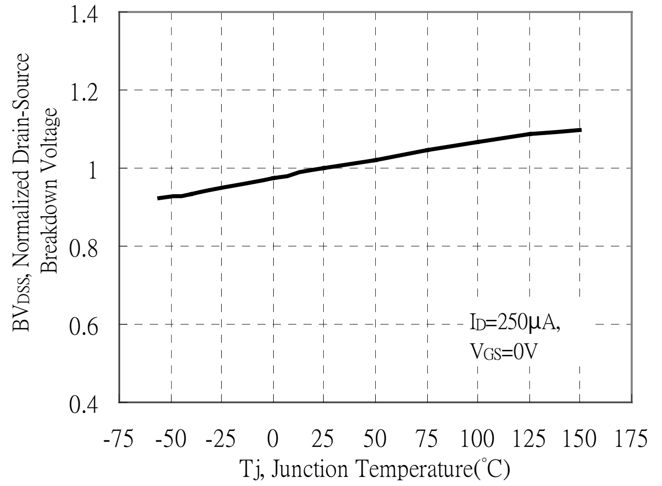
PNP Electrical Characteristics (Tj=25°C, unless otherwise specified)

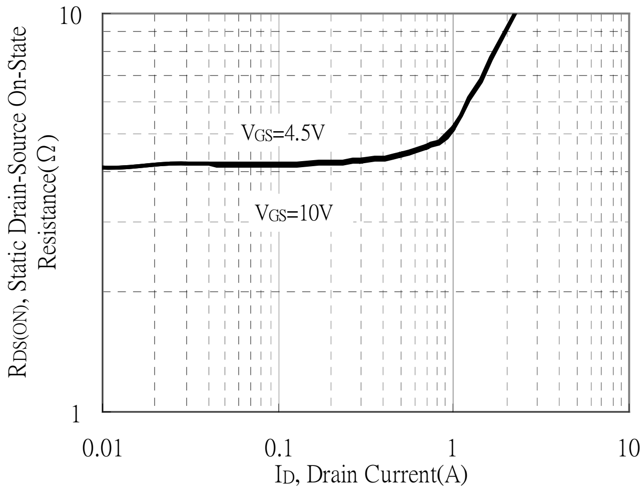
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	-400	-	-	V	I_C=-50μA
BV_{CEO}	-400	-	-	V	I_C=-1mA
BV_{EBO}	-5	-	-	V	I_E=-50μA
I_{CBO}	-	-	-100	nA	V_{CB}=-400V
I_{CES}	-	-	-100	nA	V_{CE}=-300V, R_{EB}=0Ω
I_{EBO}	-	-	-100	nA	V_{EB}=-5V
*$V_{CE(sat)}$	-	-0.17	-0.35	V	I_C=-20mA, I_B=-1mA
*$V_{CE(sat)}$	-	-0.18	-0.35	V	I_C=-50mA, I_B=-5mA
*$V_{CE(sat)}$	-	-0.18	-0.35	V	I_C=-100mA, I_B=-20mA
*$V_{BE(sat)}$	-	-0.73	-1	V	I_C=-20mA, I_B=-2mA
*h_{FE}	80	-	300	-	V_{CE}=-10V, I_C=-10mA
*h_{FE}	30	-	-	-	V_{CE}=-10V, I_C=-100mA
f_T	-	100	-	MHz	V_{CE}=-10V, I_C=-10mA, f=5MHz
Cob	-	4.6	-	pF	V_{CB}=-10V, I_E=0A, f=1MHz

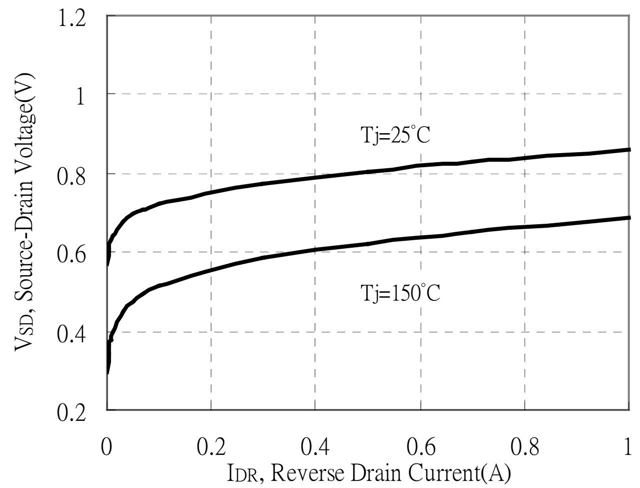
*Pulse Test: Pulse Width ≤380μs, Duty Cycle≤2%

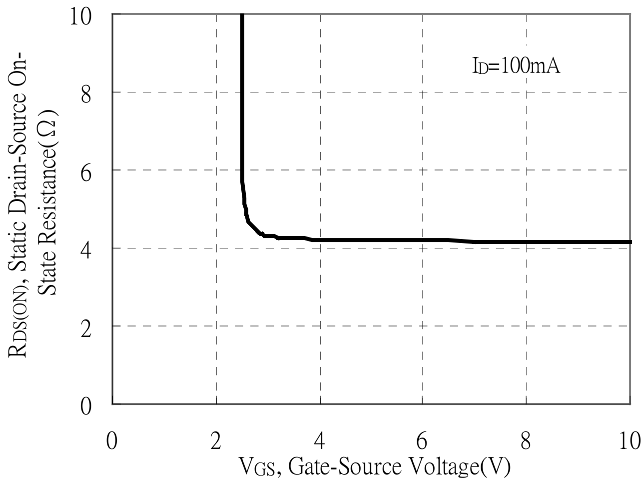
Typical Characteristics : NMOS

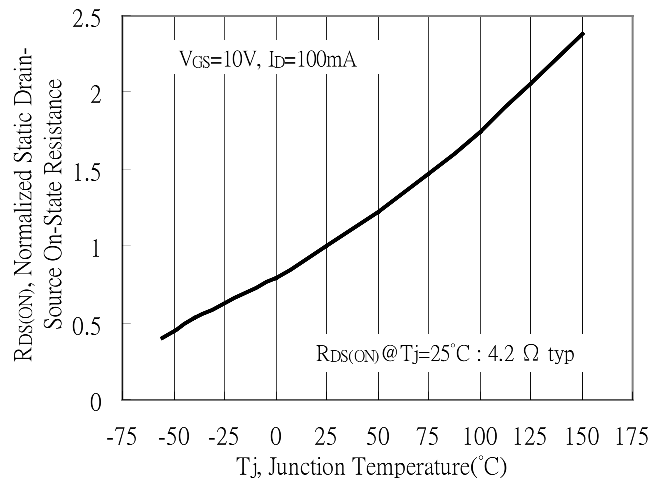




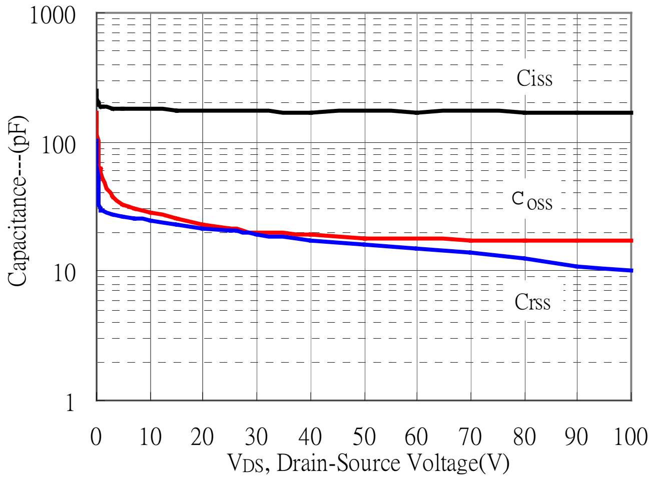


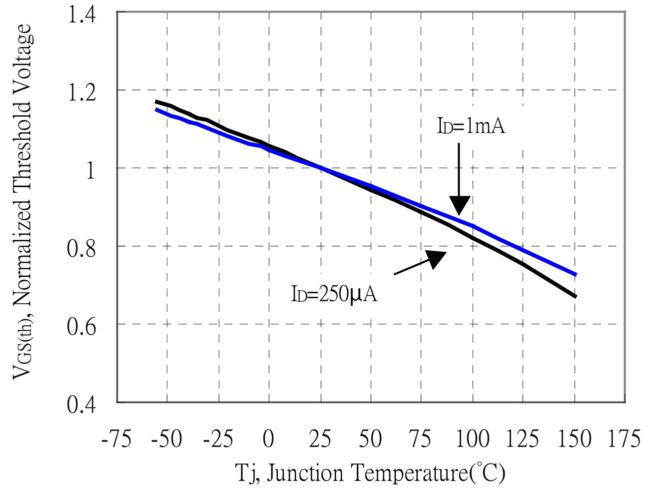


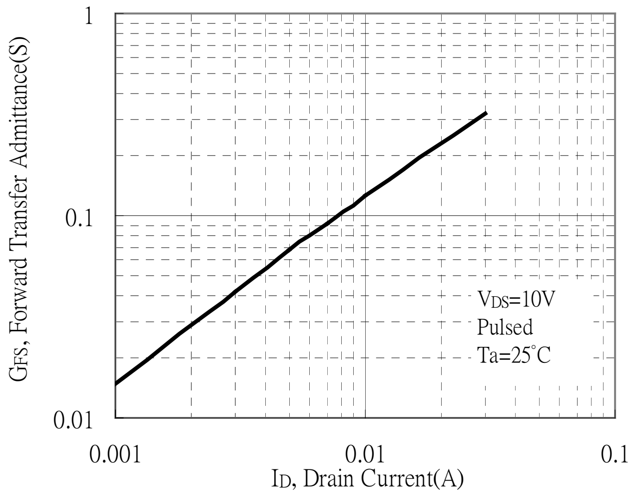


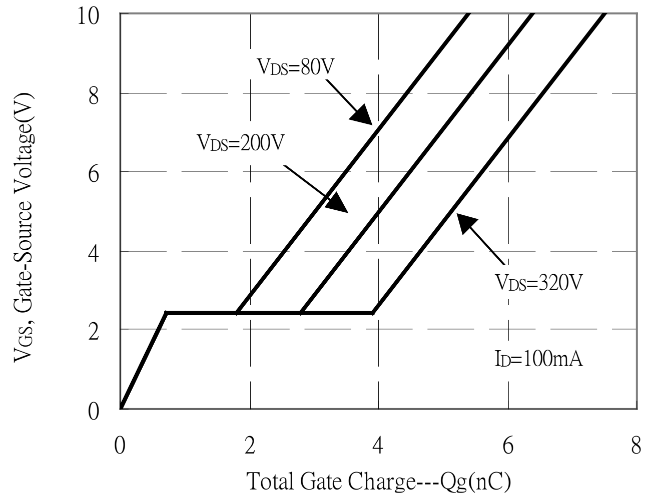


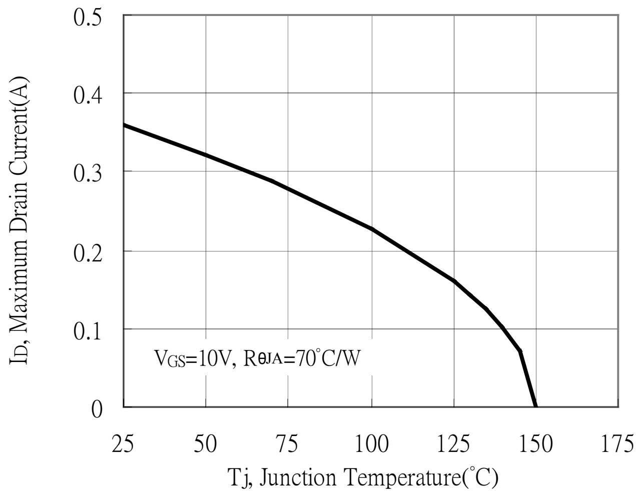
Typical Characteristics(Cont.) : NMOS

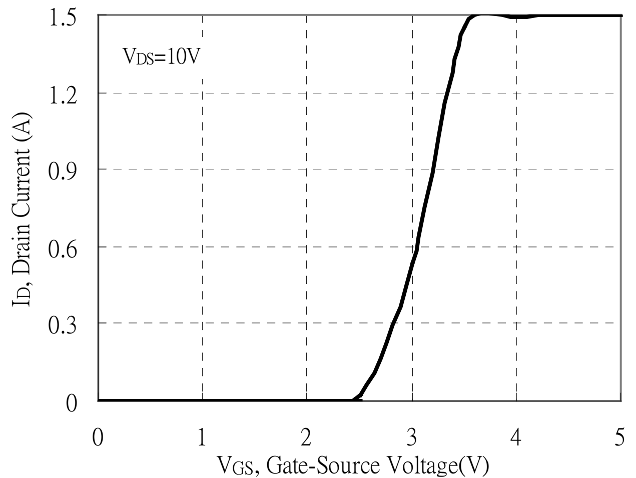




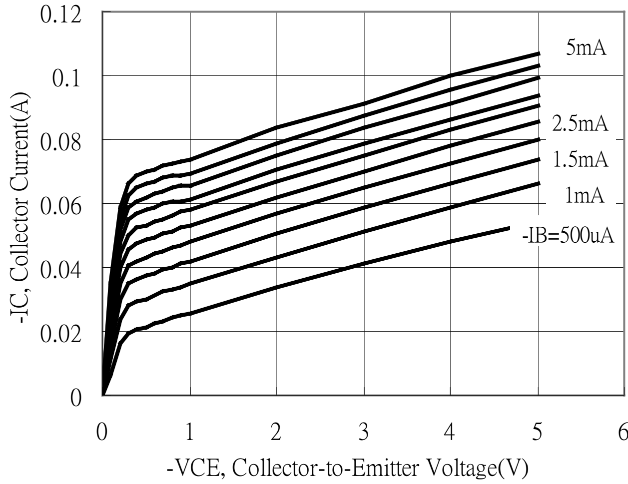


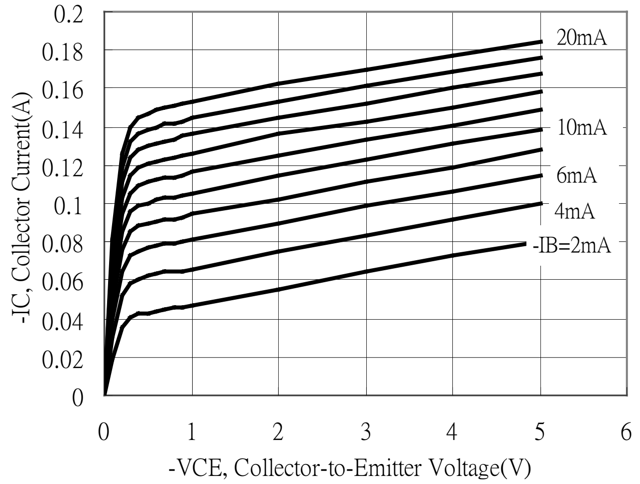


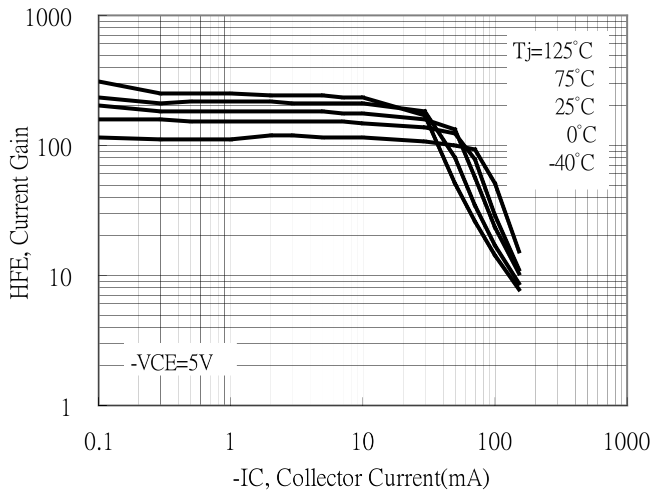


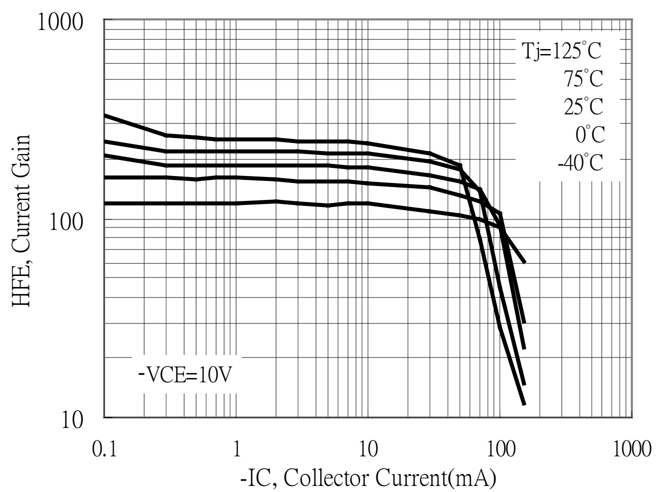


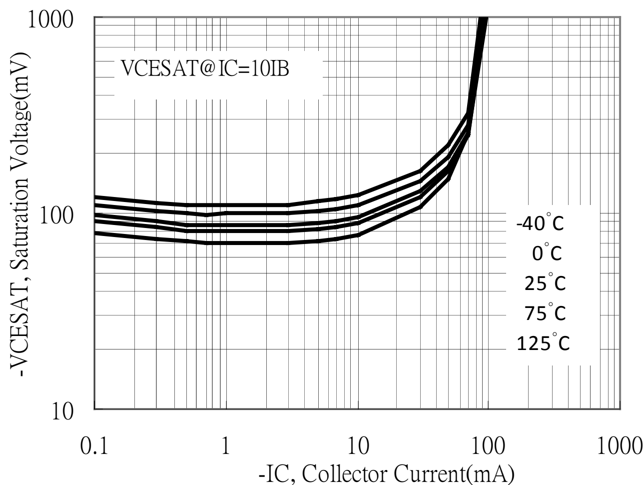
Typical Characteristics : PNP

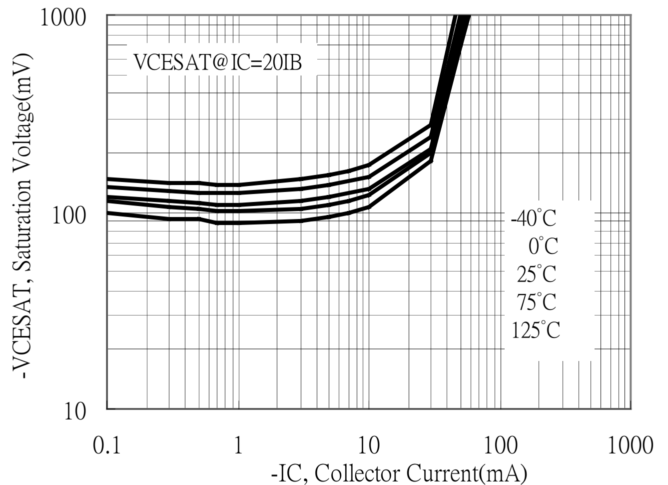




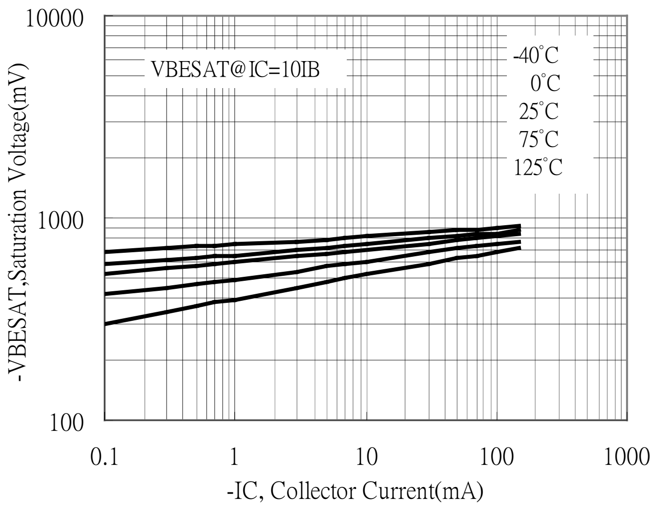


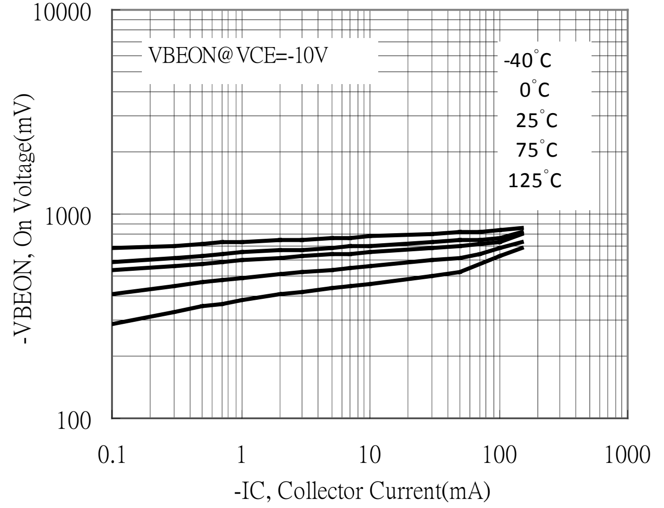


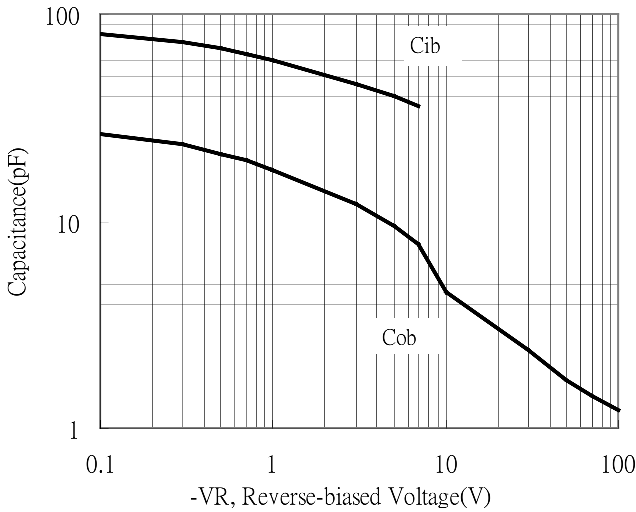




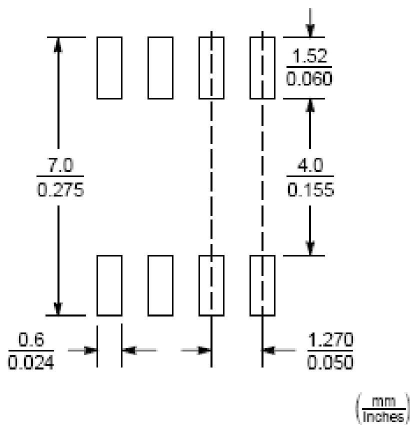
Typical Characteristics(Cont.) : FET 2



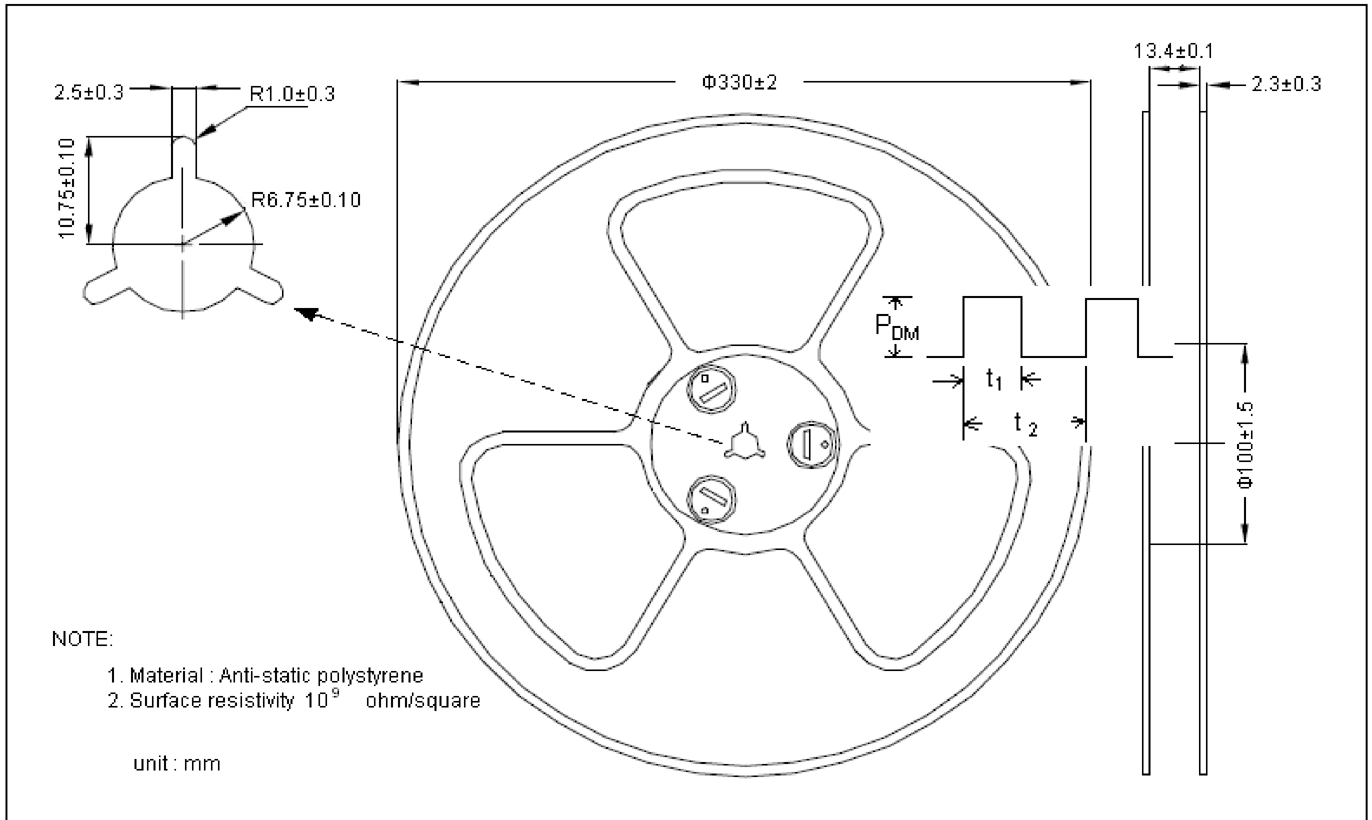




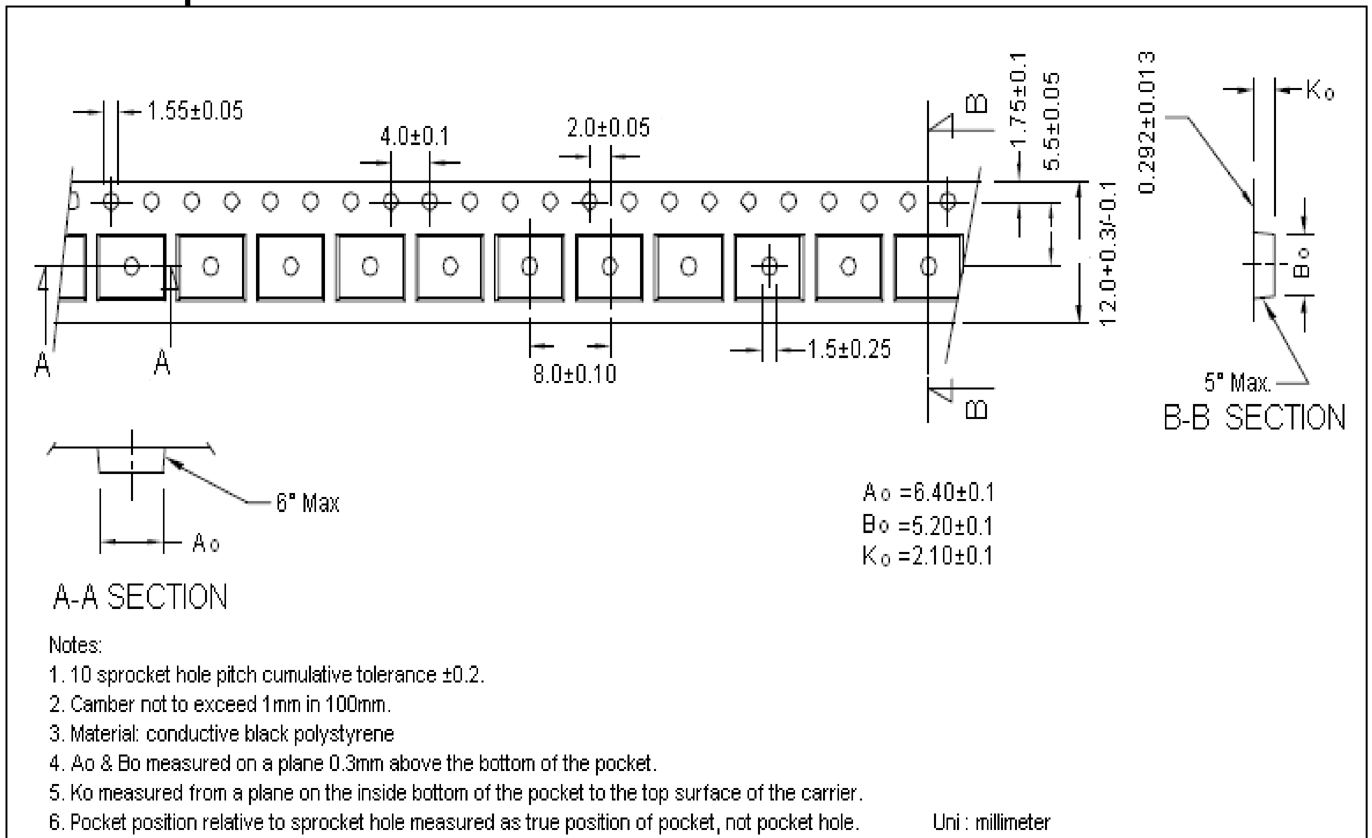
Recommended Soldering Footprint



Reel Dimension



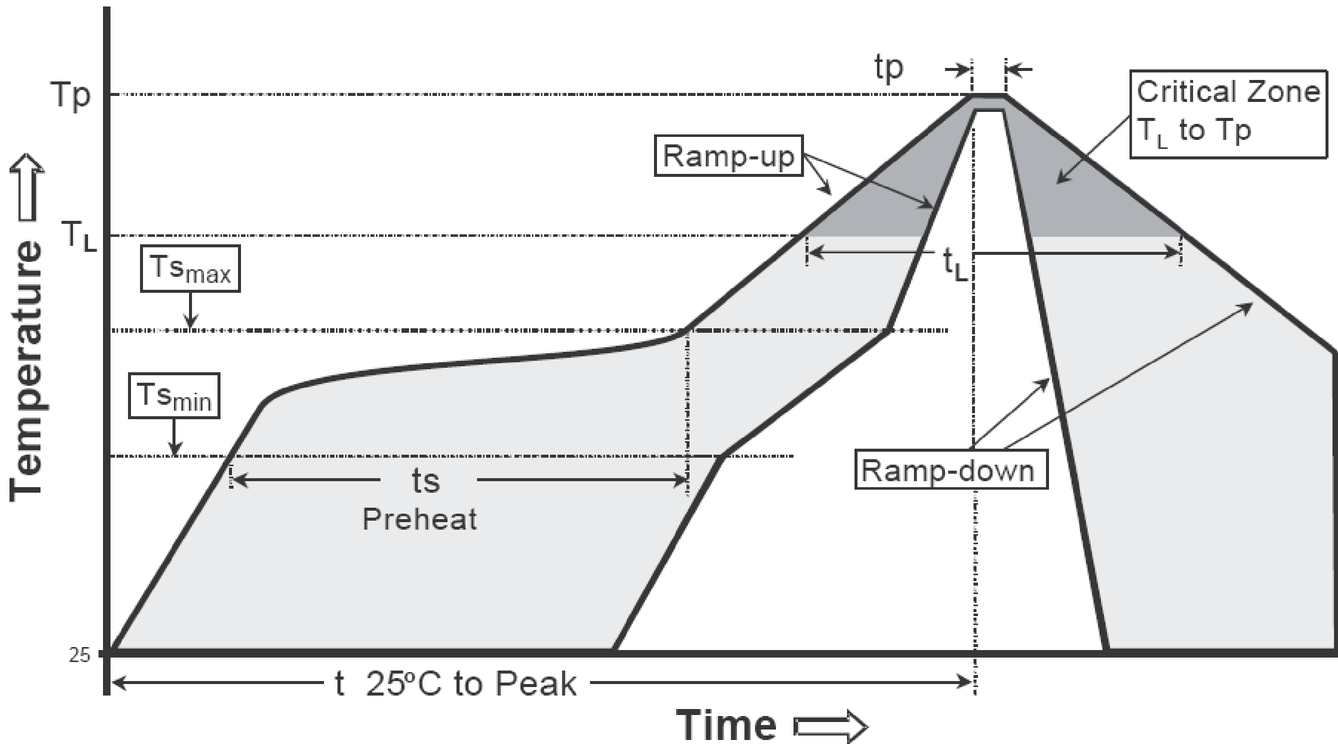
Carrier Tape Dimension



Recommended wave soldering condition

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

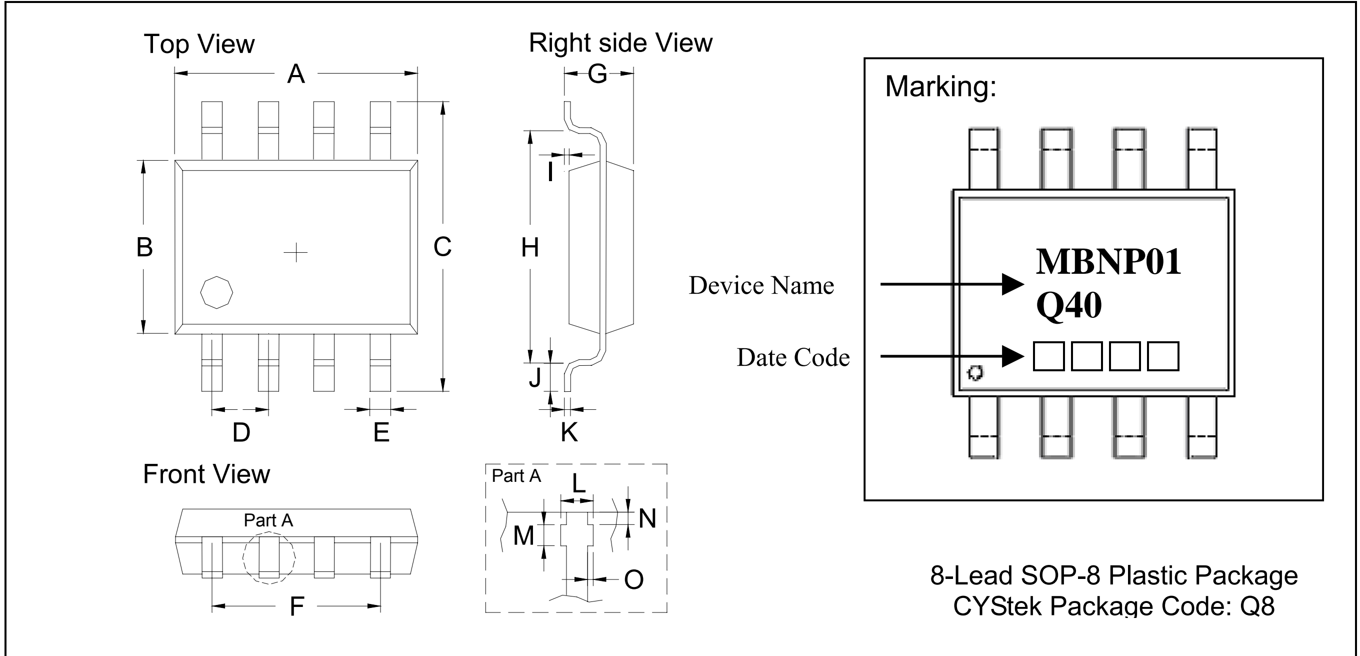
Recommended temperature profile for IR reflow



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(ts $_{min}$ to ts $_{max}$)	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.

SOP-8 Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.1909	0.2007	4.85	5.10	I	0.0019	0.0078	0.05	0.20
B	0.1515	0.1555	3.85	3.95	J	0.0118	0.0275	0.30	0.70
C	0.2283	0.2441	5.80	6.20	K	0.0074	0.0098	0.19	0.25
D	0.0480	0.0519	1.22	1.32	L	0.0145	0.0204	0.37	0.52
E	0.0145	0.0185	0.37	0.47	M	0.0118	0.0197	0.30	0.50
F	0.1472	0.1527	3.74	3.88	N	0.0031	0.0051	0.08	0.13
G	0.0570	0.0649	1.45	1.65	O	0.0000	0.0059	0.00	0.15
H	0.1889	0.2007	4.80	5.10					

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.

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