

P-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTDP4953BDYQ8

Description

The MTDP4953BDYQ8 is a P-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

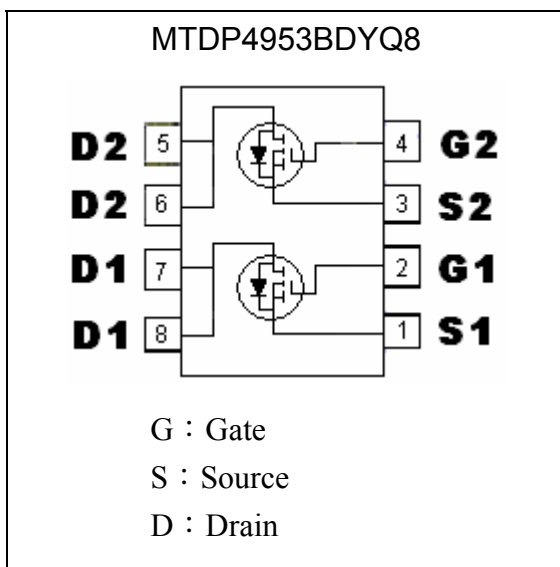
Features

- $R_{DS(ON)}=42m\Omega @V_{GS}=-10V, I_D=-5A$
 $R_{DS(ON)}=70m\Omega @V_{GS}=-4.5V, I_D=-4A$
- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free lead plating package

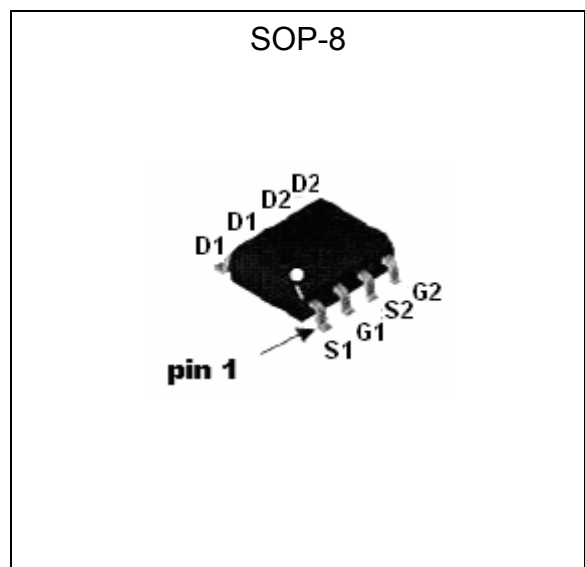
Applications

- Power management in notebook computer, portable equipment and battery powered systems.

Equivalent Circuit



Outline





Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Breakdown Voltage	BV _{DSS}	-30	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current @T _A =25 °C (Note 1)	I _D	-5	A
Continuous Drain Current @T _A =70 °C (Note 1)	I _D	-4	A
Pulsed Drain Current (Note 2)	I _{DM}	-20	A
Total Power Dissipation (Note 1)	P _d	2	W
Linear Derating Factor		0.02	W / °C
Operating Junction Temperature	T _j	-55~+150	°C
Storage Temperature	T _{stg}	-55~+150	°C
Thermal Resistance, Junction-to-Ambient (Note 1)	R _{th,ja}	62.5	°C/W

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, t≤10s.
 2.Pulse width ≤300μs, duty cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-30	-	-	V	V _{GS} =0, I _D =-250μA
V _{GS(th)}	-1	-	-2.5	V	V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0
I _{DSS}	-	-	-1	μA	V _{DS} =-24V, V _{GS} =0
*R _{Ds(ON)}	-	-	42	mΩ	I _D =-5A, V _{GS} =-10V
	-	-	70		I _D =-4A, V _{GS} =-4.5V
*G _{FS}	-	5	-	S	V _{DS} =-5V, I _D =-5A
Dynamic					
C _{iSS}	-	582	-	pF	V _{DS} =-15V, V _{GS} =0, f=1MHz
C _{oSS}	-	125	-		
C _{rSS}	-	86	-		
*t _{d(ON)}	-	9	-	ns	V _{DS} =-15V, I _D =-1A, V _{GS} =-10V, R _G =6Ω, R _D =15Ω
*t _r	-	10	-		
*t _{d(OFF)}	-	37	-		
*t _f	-	23	-		
*Q _g	-	11.7	-	nC	V _{DS} =-15V, I _D =-5A, V _{GS} =-10V,
*Q _{gs}	-	2.1	-		
*Q _{gd}	-	2.9	-		
Source-Drain Diode					
*V _{SD}	-	-0.84	-1.2	V	V _{GS} =0V, I _S =-1.7A

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

Characteristic Curves

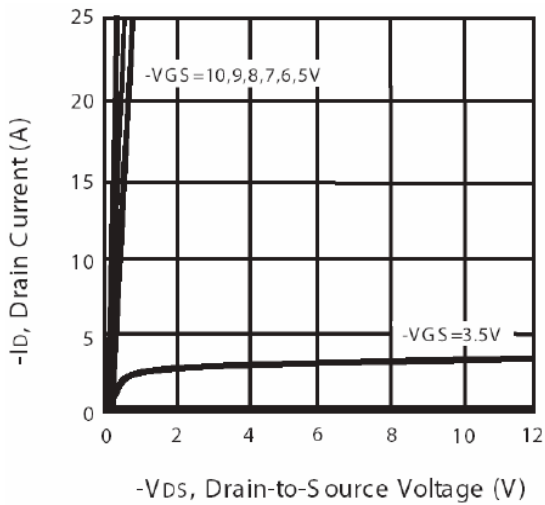


Fig 1. Typical Output Characteristics

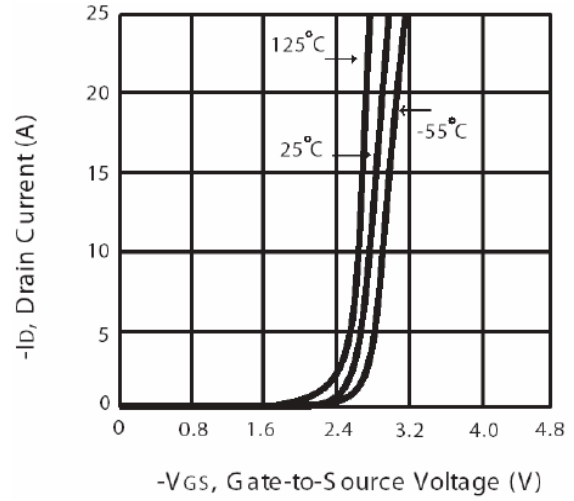


Fig 2. Transfer Characteristics

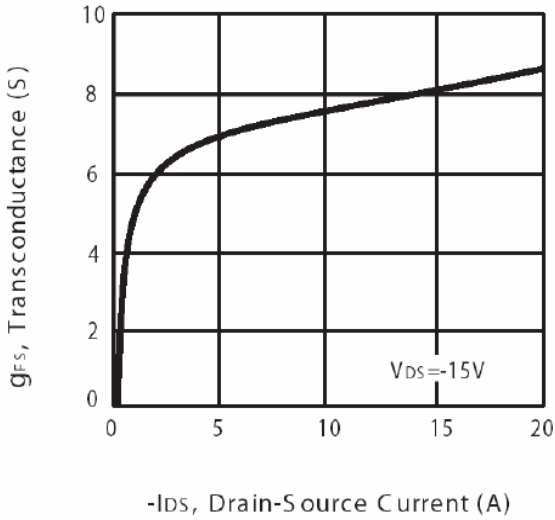


Fig 3. Transconductance v.s. Drain Current

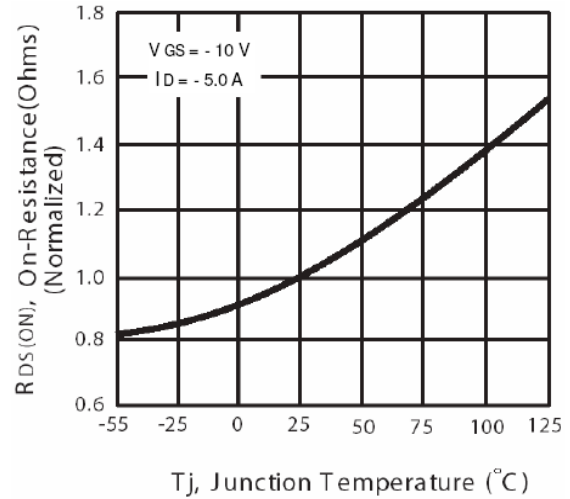


Fig 4. On-Resistance v.s. Junction Temperature

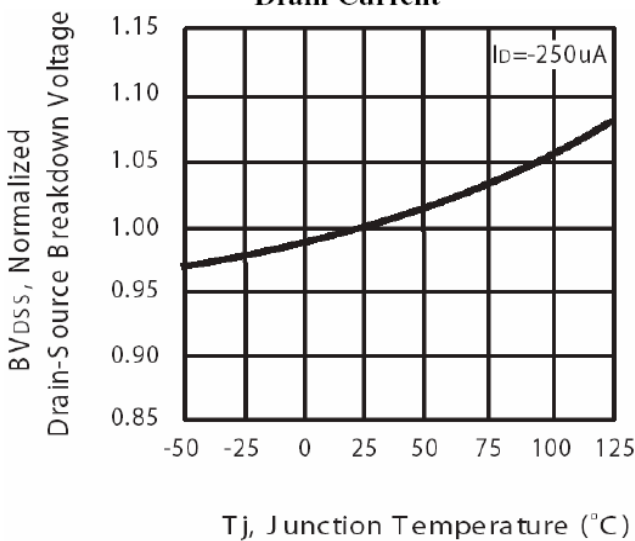


Fig 5. Breakdown Voltage v.s. Junction Temperature

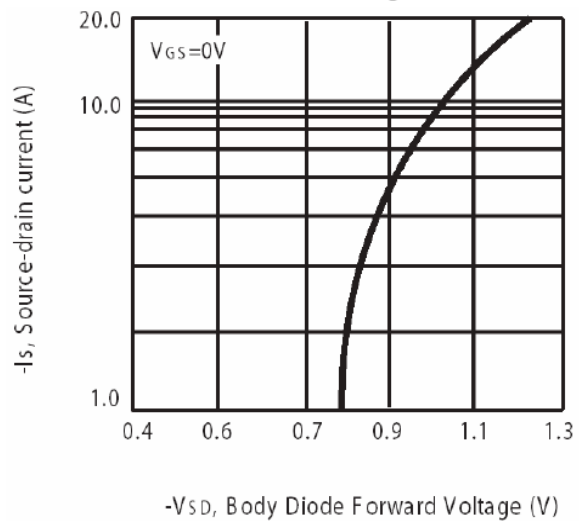


Fig 6. Body Diode Forward Voltage v.s. Source Current

Characteristic Curves(Cont.)

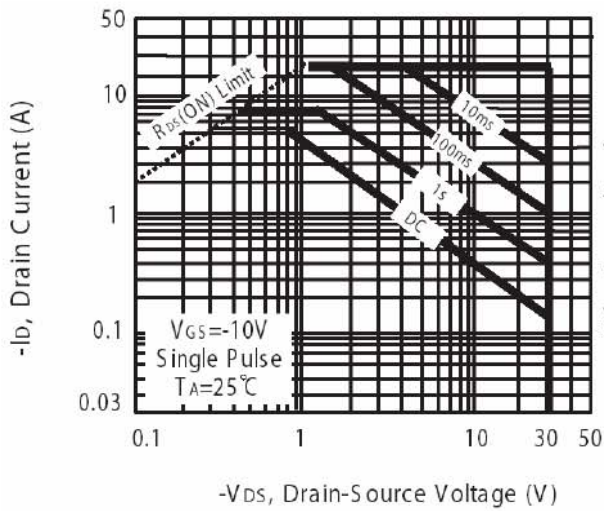


Fig 7. Maximum Safe Operating Area

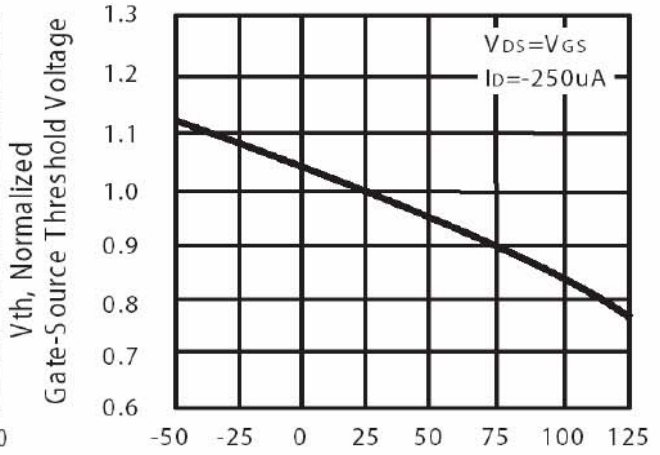


Fig 8. Gate Threshold Voltage v.s. Junction Temperature

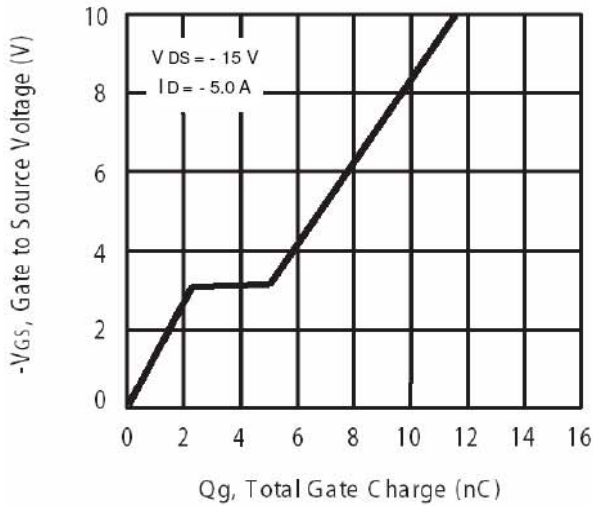


Fig 9. Gate Charge Characteristics

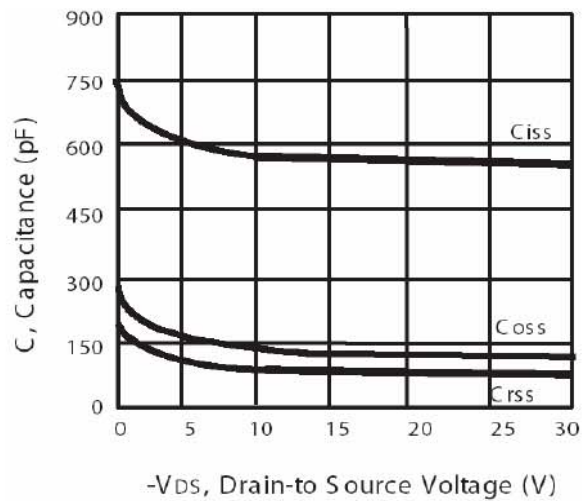


Fig 10. Typical Capacitance Characteristics

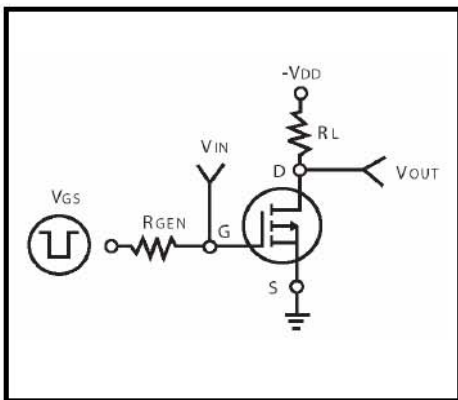


Fig 11. Switching Time Circuit

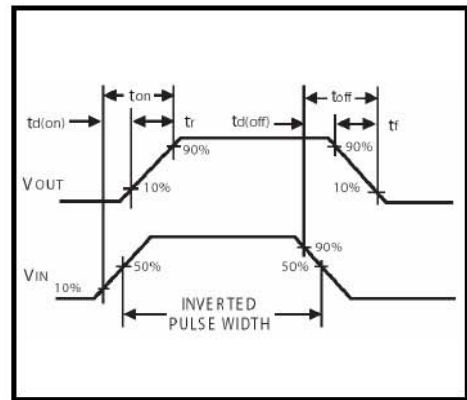


Fig 12. Switching Time Waveform

Characteristic Curves(Cont.)

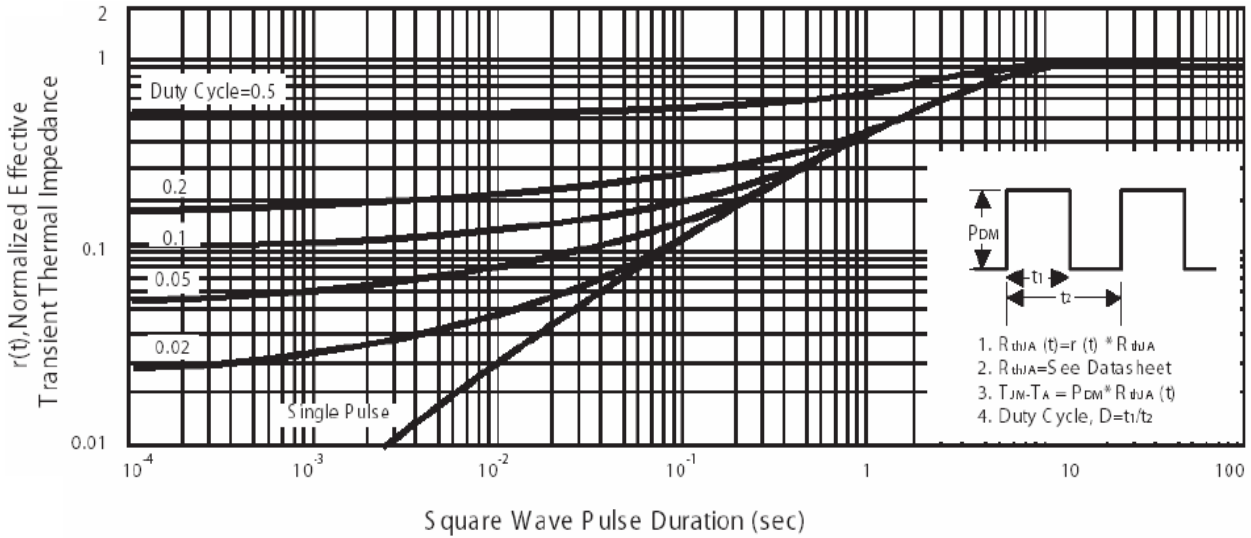
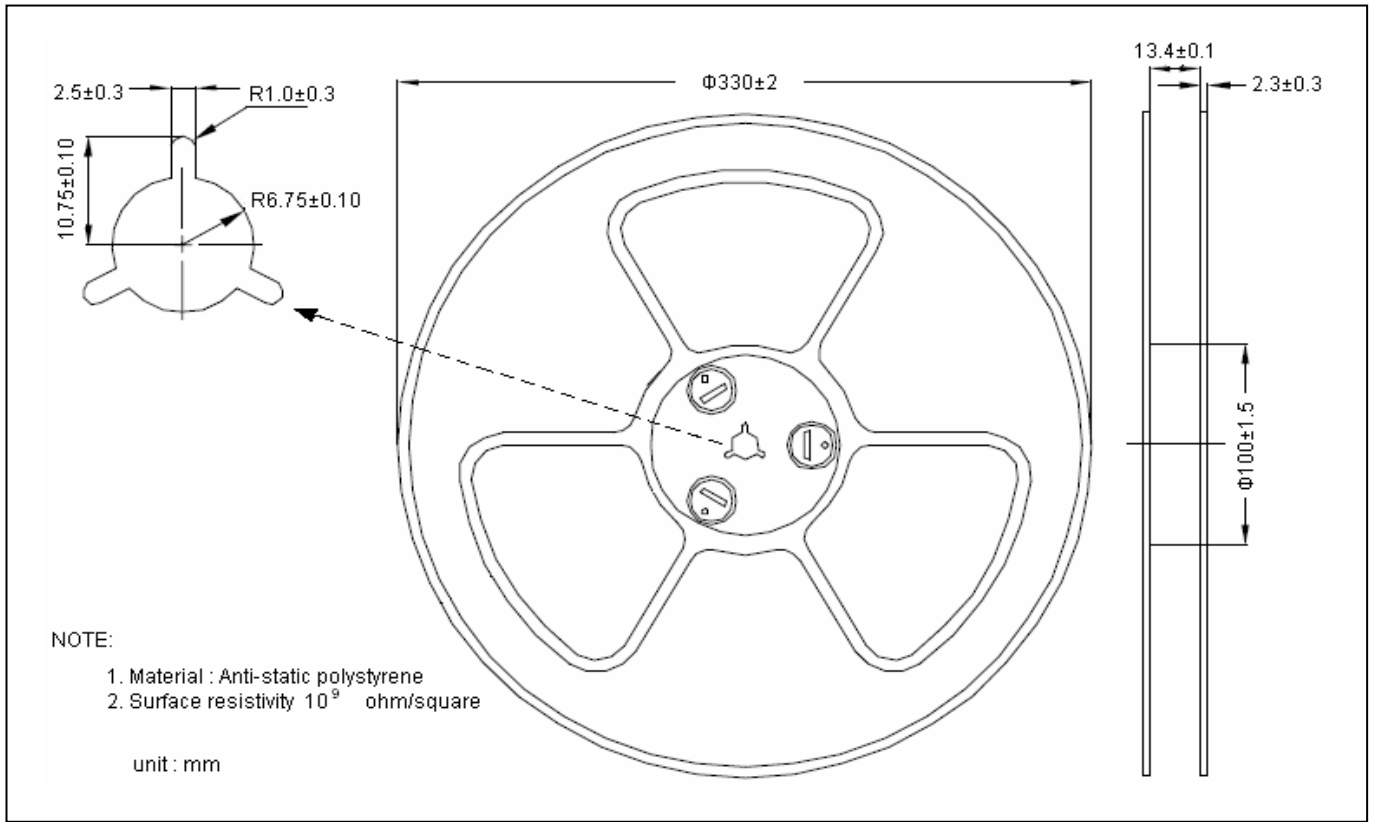


Fig 13. Normalized Thermal Transient Impedance Curve

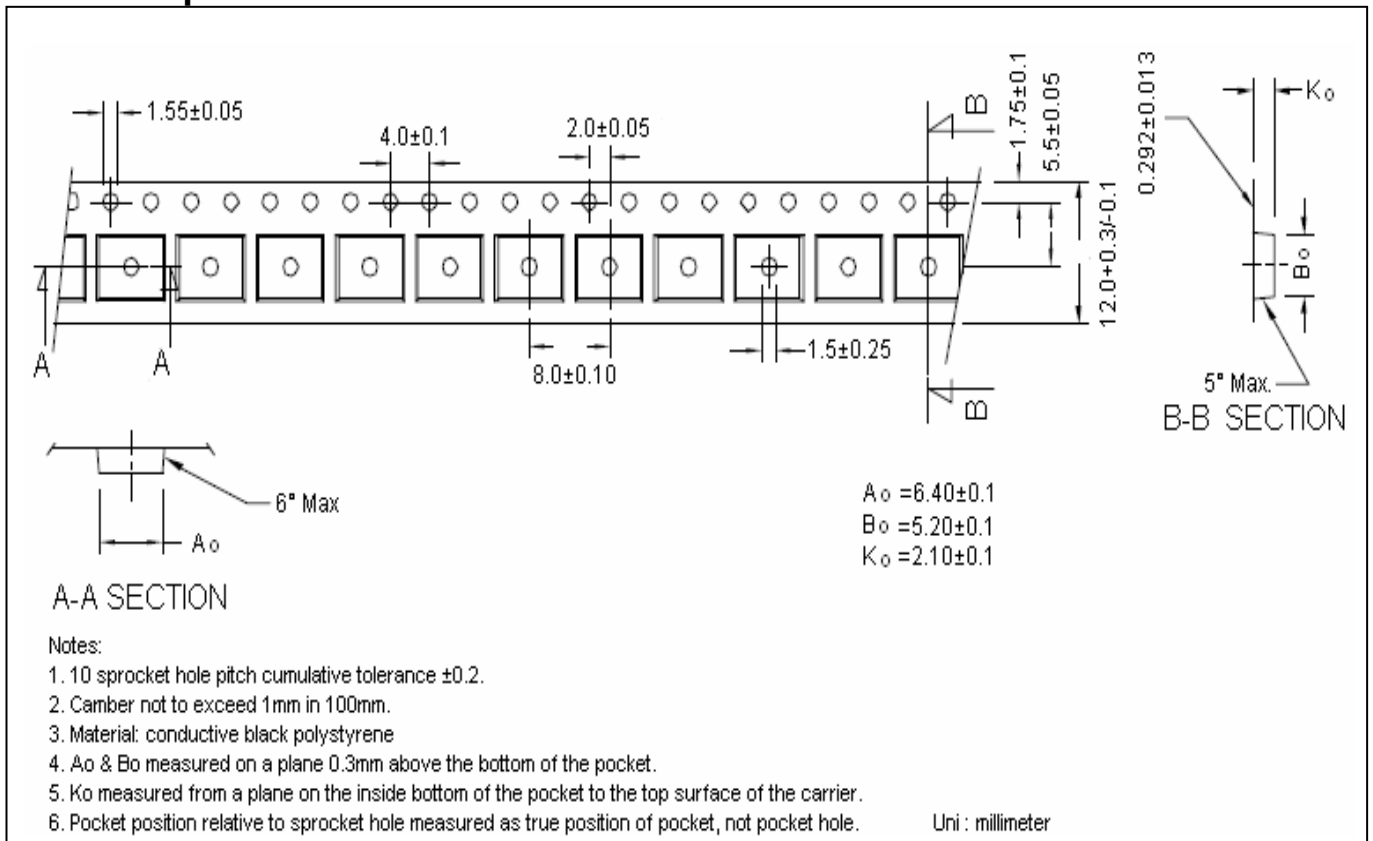
Ordering Information

Device	Package	Shipping	Marking
MTDP4953BDYQ8	SOP-8 (Pb-free lead plating package)	3000 pcs / Tape & Reel	4953BDYSS

Reel Dimension



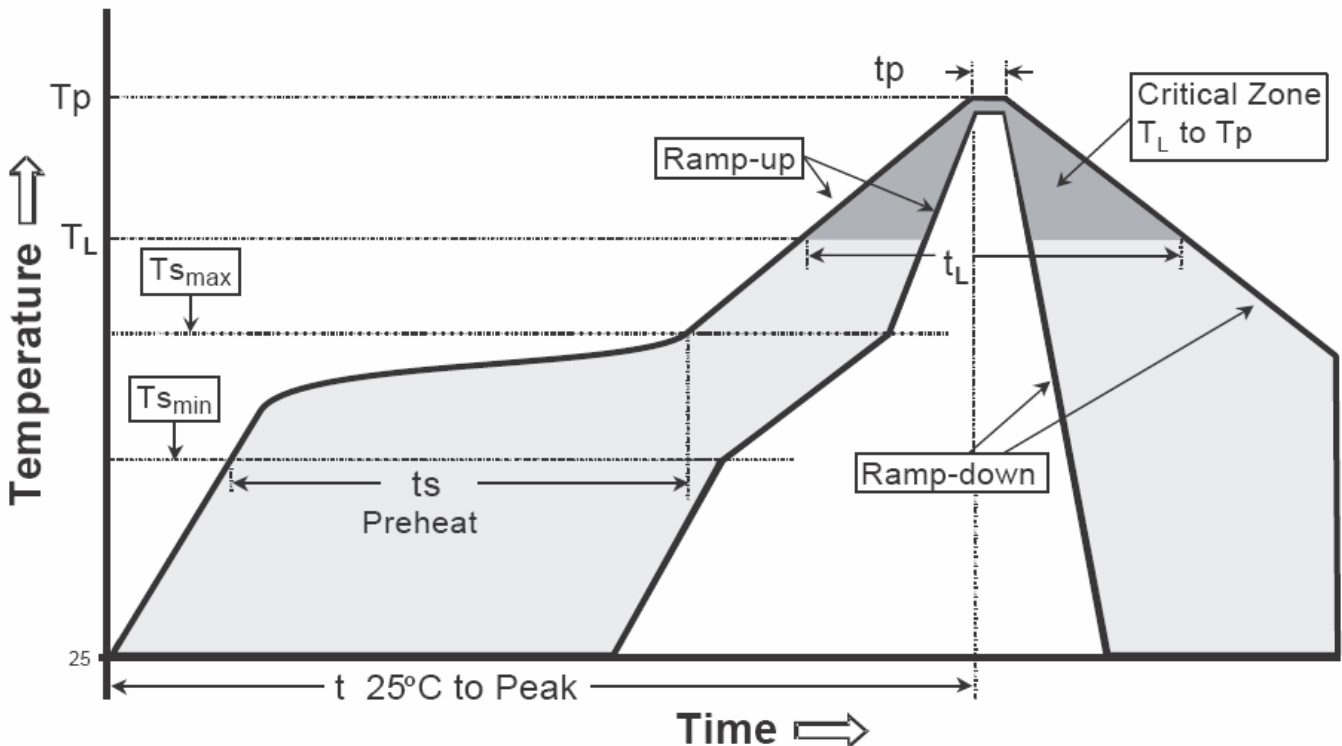
Carrier Tape Dimension



Recommended wave soldering condition

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

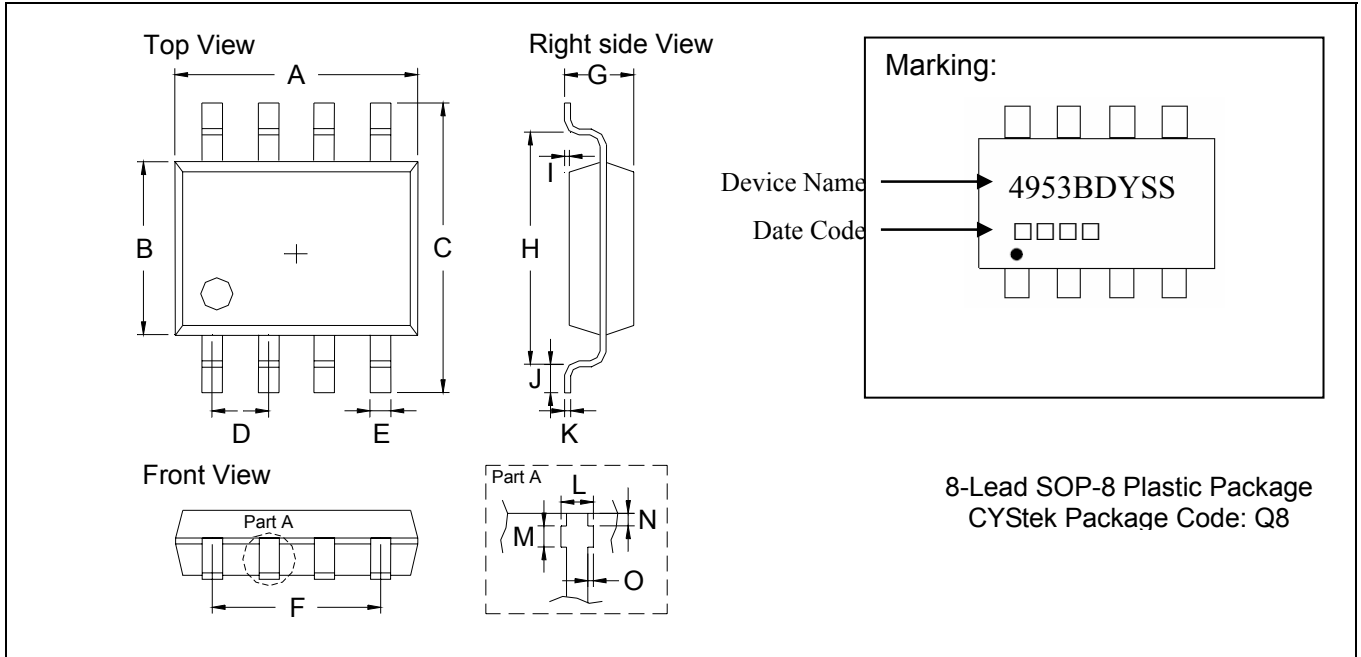
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (T _{smax} to T _p)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(T _{s min})	100°C	150°C
-Temperature Max(T _{s max})	150°C	200°C
-Time(t _{s min} to t _{s max})	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (T _L)	183°C	217°C
- Time (t _L)	60-150 seconds	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	0.1890	0.2007	4.80	5.10	I	0.0098	REF	0.25	REF
B	0.1496	0.1654	3.80	4.20	J	0.0118	0.0354	0.30	0.90
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	0.0138	0.0193	0.35	0.49	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	0.0531	0.0689	1.35	1.75	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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