N- AND P-CHANNEL ENHANCEMENT MODE POWER MOSFET

MTC4505Q8

	N-CH	P-CH
BVDSS	30V	-30V
ID	12A	-10A
RDSON(max)	14mΩ	20mΩ

Description

The MTC4505Q8 consists of a N-channel and a P-channel enhancement-mode MOSFET in a single SOP-8 package, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

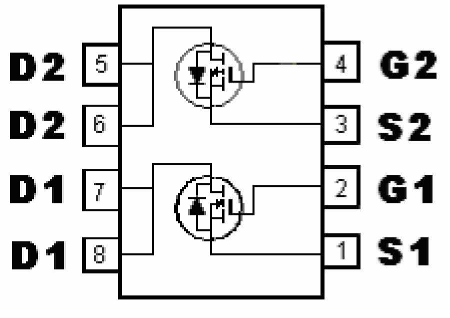
The SOP-8 package is universally preferred for all commercial-industrial surface mount applications and suited for low voltage applications such as DC/DC converters.

Features

- Simple drive requirement
- Low on-resistance
- Fast switching speed
- Pb-free lead plating and halogen-free package

Equivalent Circuit

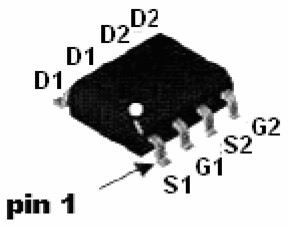
MTC4505Q8



G：Gate
S：Source
D：Drain

Outline

SOP-8



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

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Breakdown Voltage	BV_{DSS}	30	-30	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current @T_A=25 °C, V_{GS}=10V (Note 1)	I_D	12	-10	A
Continuous Drain Current @T_A=70 °C, V_{GS}=10V (Note 1)	I_D	10	-8	A
Pulsed Drain Current (Note 2)	I_{DM}	30	-30	A
Total Power Dissipation @T_A=25°C (Note 1)	Pd	2.0		W
Linear Derating Factor		0.016		W / °C
Operating Junction and Storage Temperature Range	Tj, Tstg	-55~+150		°C
Thermal Resistance, Junction-to-Ambient (Note 1)	Rth,ja	62.5		°C/W

Note : 1.Surface mounted on 1 in² copper pad of FR-4 board, 135°C/W when mounted on minimum copper pad
2.Pulse width limited by maximum junction temperature

N-Channel 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=250μA
$BV_{DSS}/\Delta Tj$	-	0.02	-	V/°C	Reference to 25 °C, I_D=1mA
$V_{GS(th)}$	1.0	1.5	3.0	V	V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0
I_{DSS}	-	-	1	μA	V_{DS}=30V, V_{GS}=0
	-	-	25	μA	V_{DS}=24V, V_{GS}=0, Tj=70°C
*$R_{DS(ON)}$	-	-	14	mΩ	I_D=9A, V_{GS}=10V
	-	-	20		I_D=5A, V_{GS}=4.5V
*G_{FS}	-	14	-	S	V_{DS}=10V, I_D=9A
Dynamic					
Ciss	-	1770	2830	pF	V_{DS}=25V, V_{GS}=0, f=1MHz
Coss	-	430	-		
Crss	-	350	-		
*$t_{d(ON)}$	-	14	-	ns	V_{DS}=15V, I_D=1A, V_{GS}=10V, R_G=3.3Ω, R_D=15Ω
*t_r	-	10	-		
*$t_{d(OFF)}$	-	36	-		
*t_f	-	17	-		
*Qg	-	23	65	nC	V_{DS}=24V, I_D=9A, V_{GS}=4.5V
*Qgs	-	6	-		
*Qgd	-	14	-		
Source-Drain Diode					
*V_{SD}	-	-	1.2	V	V_{GS}=0V, I_S=1.7A
*trr	-	31	-	ns	I_S=9A, V_{GS}=0, dI/dt=100A/μs
*Qrr	-	25	-	nC	

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

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	$V_{GS}=0$, $I_D=-250\mu A$
$BV_{DSS}/\Delta Tj$	-	-0.02	-	V/°C	Reference to 25 °C, $I_D=-1mA$
$V_{GS(th)}$	-1.0	-	-3.0	V	$V_{DS}=V_{GS}$, $I_D=-250\mu A$
I_{GSS}	-	-	±100	nA	$V_{GS}=\pm 20V$, $V_{DS}=0$
I_{DSS}	-	-	-1	µA	$V_{DS}=-30V$, $V_{GS}=0$
	-	-	-25	µA	$V_{DS}=-24V$, $V_{GS}=0$, Tj=70°C
$*R_{DS(ON)}$	-	-	20	mΩ	$I_D=-8A$, $V_{GS}=-10V$
	-	-	30		$I_D=-4A$, $V_{GS}=-4.5V$
$*G_{FS}$	-	14	-	S	$V_{DS}=-10V$, $I_D=-8A$
Dynamic					
Ciss	-	1580	2530	pF	$V_{DS}=-25V$, $V_{GS}=0$, f=1MHz
Coss	-	540	-		
Crss	-	450	-		
$*t_{d(ON)}$	-	16	-	ns	$V_{DS}=-15V$, $I_D=-1A$, $V_{GS}=-10V$, $R_G=3.3\Omega$, $R_D=15\Omega$
$*t_r$	-	11	-		
$*t_{d(OFF)}$	-	40	-		
$*t_f$	-	25	-		
*Qg	-	27	45	nC	$V_{DS}=-24V$, $I_D=-8A$, $V_{GS}=-4.5V$
*Qgs	-	4	-		
*Qgd	-	18	-		
Source-Drain Diode					
$*V_{SD}$	-	-	-1.2	V	$V_{GS}=0V$, $I_S=-1.7A$
*trr	-	40	-	ns	$I_S=-8A$, $V_{GS}=0$, dI/dt=100A/µs
*Qrr	-	32	-	nC	

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

Ordering Information

Device	Package	Shipping
MTC4505Q8-0-T3-G	SOP-8 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Environment friendly grade : S for RoHS compliant products, G for RoHS compliant and green compound products

Packing spec, T3 : 3000 pcs / tape & reel, 13” reel

Product rank, zero for no rank products

Product name

N-channel Characteristic Curves

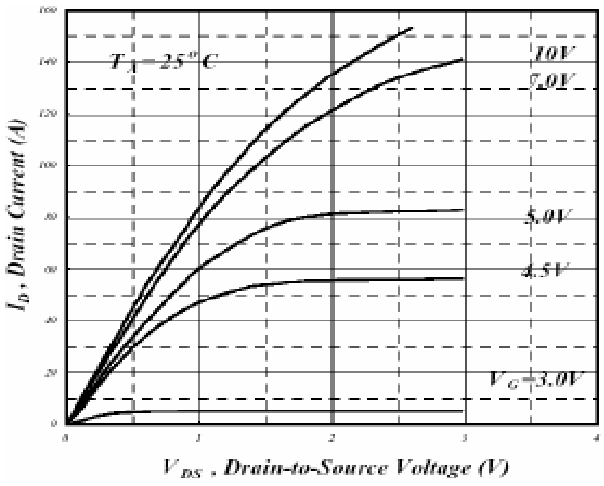


Fig 1. Typical Output Characteristics

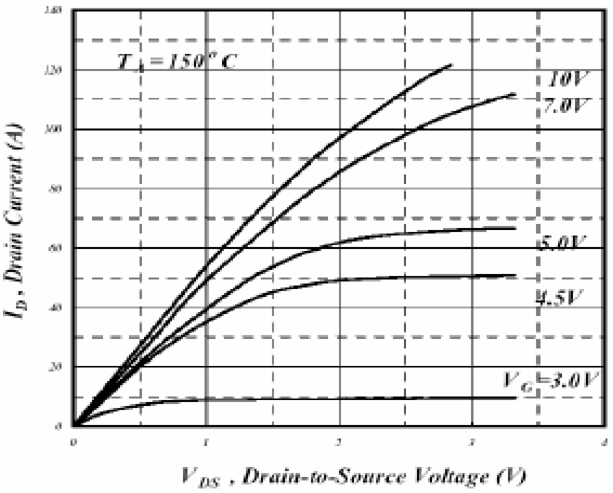


Fig 2. Typical Output Characteristics

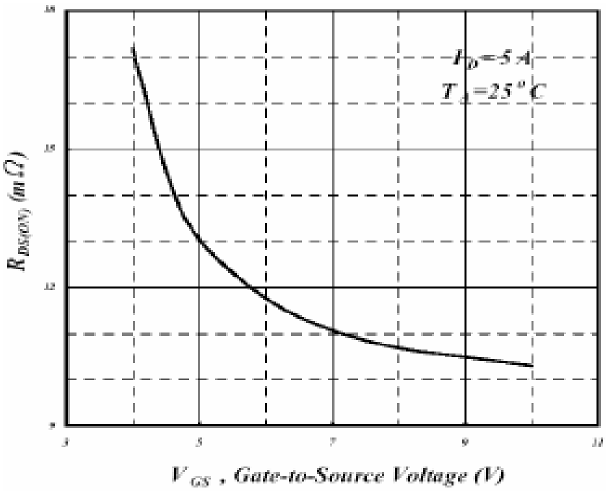


Fig 3. On-Resistance vs. Gate Voltage

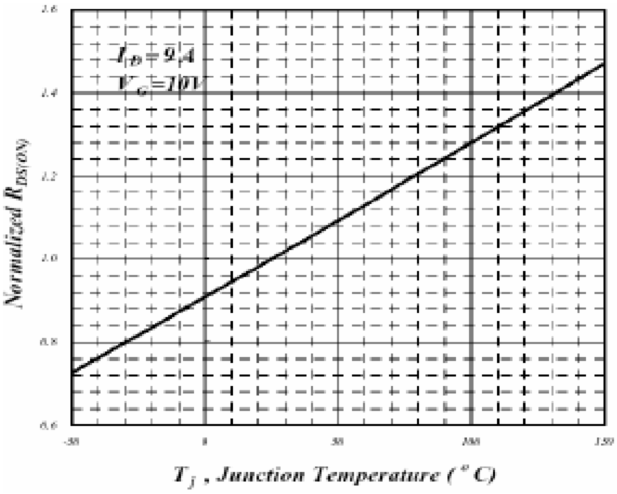


Fig 4. Normalized On-Resistance vs. Junction Temperature

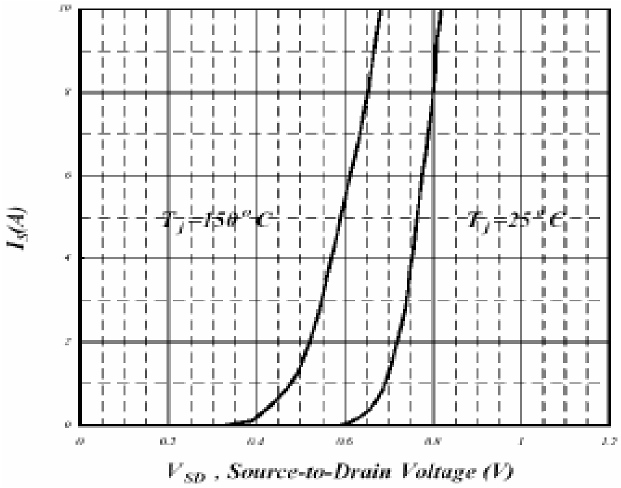


Fig 5. Forward Characteristics of Reverse Diode

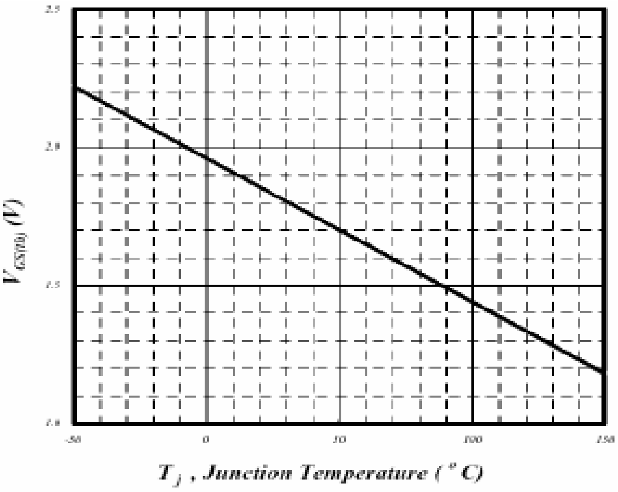


Fig 6. Gate Threshold Voltage vs. Junction Temperature

N-channel Characteristic Curves(Cont.)

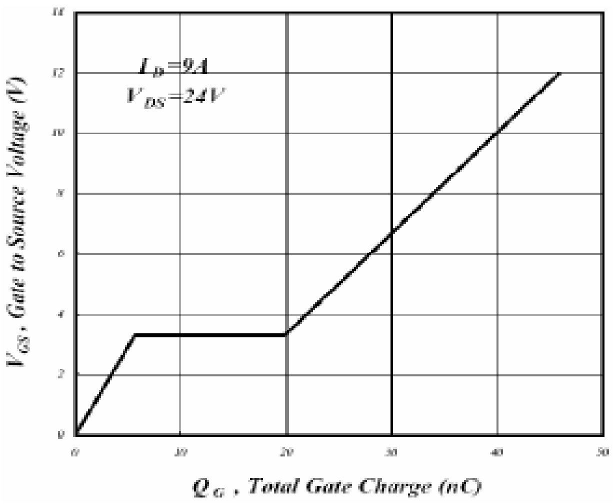


Fig 7. Gate Charge Characteristics

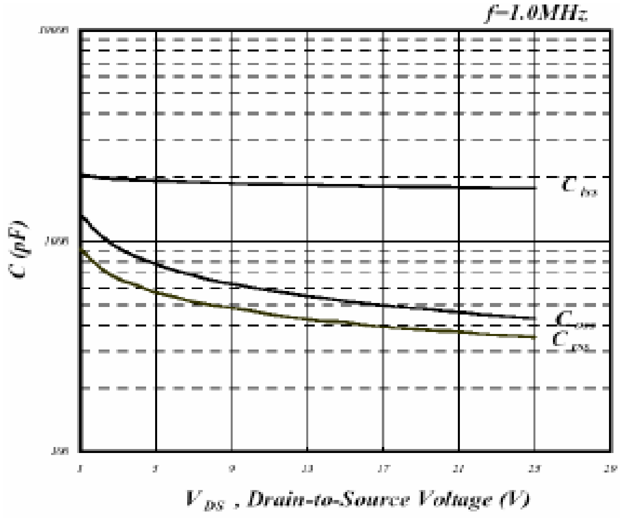


Fig 8. Typical Capacitance Characteristics

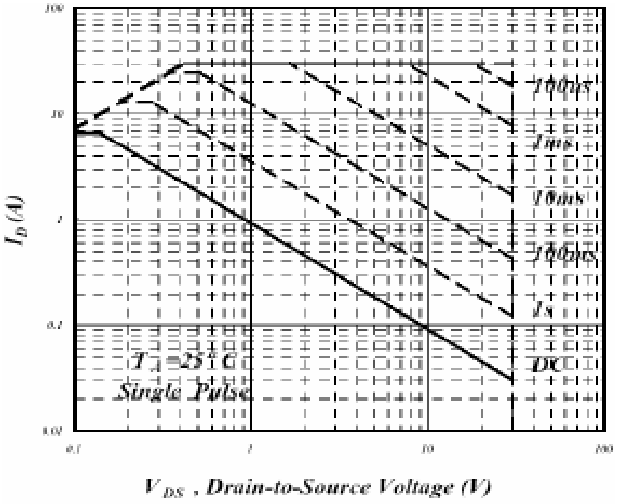


Fig 9. Maximum Safe Operating Area

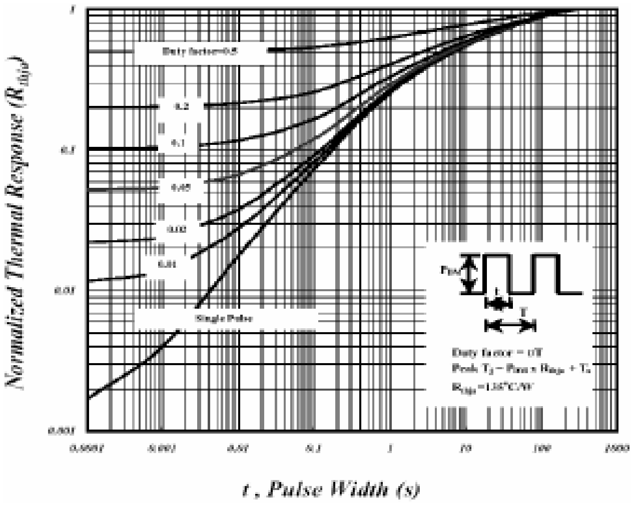


Fig 10. Effective Transient Thermal Impedanc

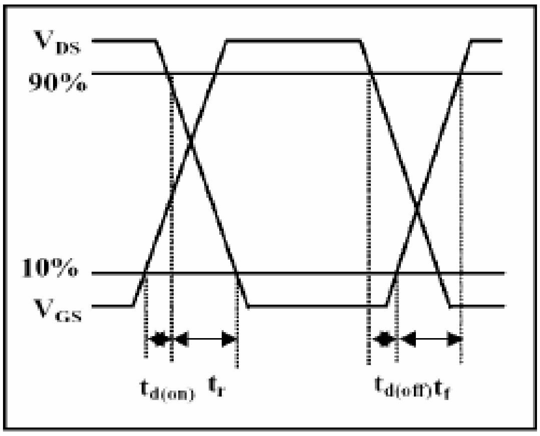


Fig 11. Switching Time Waveform

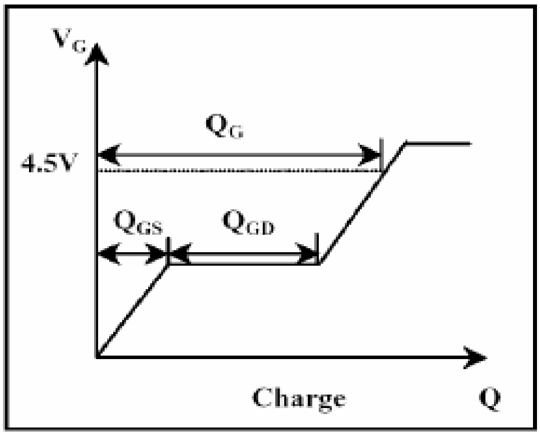


Fig 12. Gate Charge Waveform

P-Channel Characteristic Curves

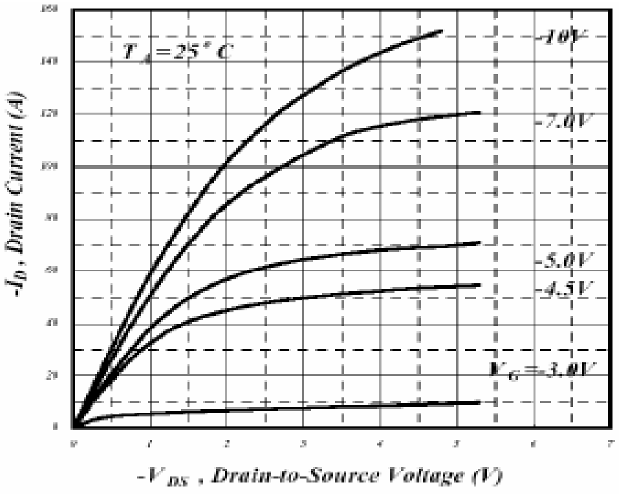


Fig 1. Typical Output Characteristics

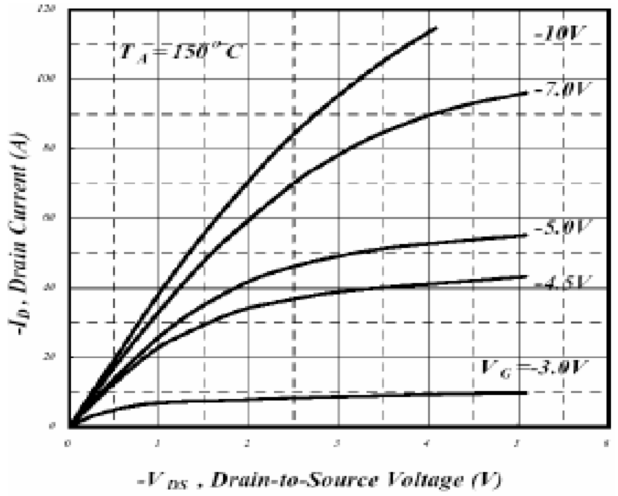


Fig 2. Typical Output Characteristics

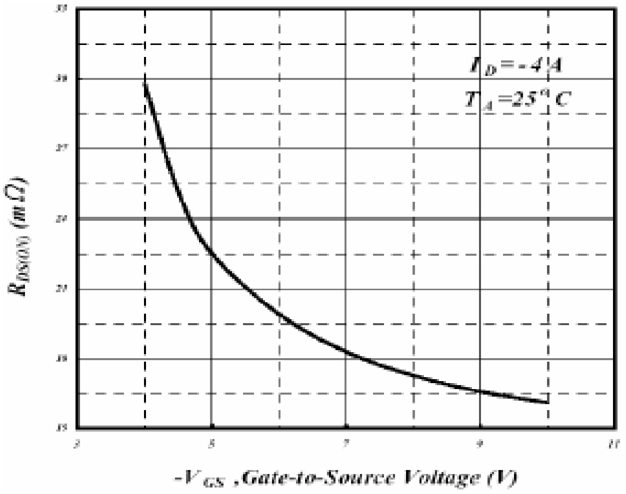


Fig 3. On-Resistance vs. Gate Voltage

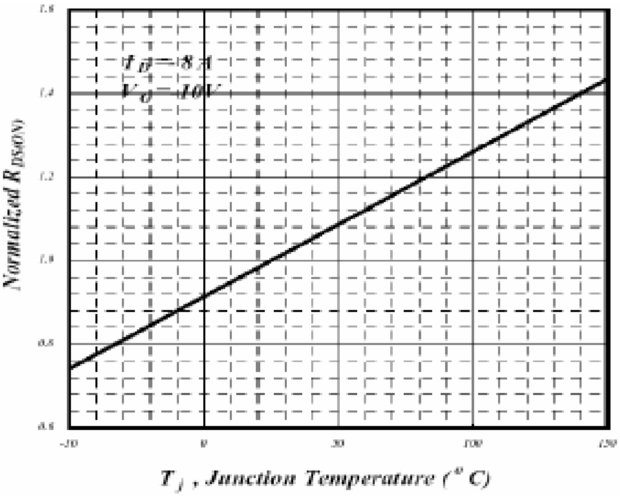


Fig 4. Normalized On-Resistance
vs. Junction Temperature

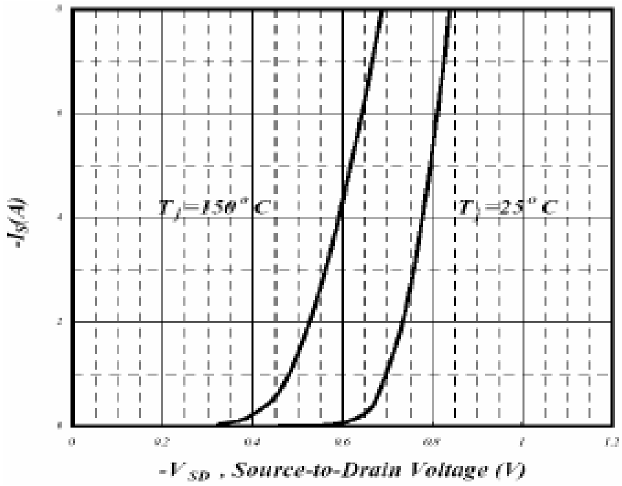


Fig 5. Forward Characteristics of
Reverse Diode

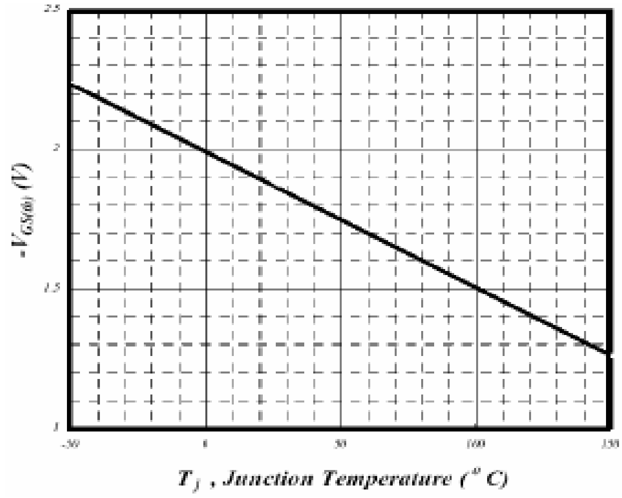


Fig 6. Gate Threshold Voltage vs.
Junction Temperature

P-channel Characteristic Curves(Cont.)

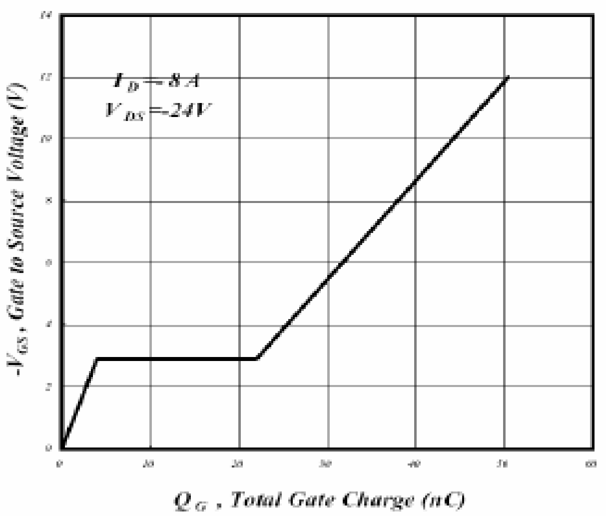


Fig 7. Gate Charge Characteristics

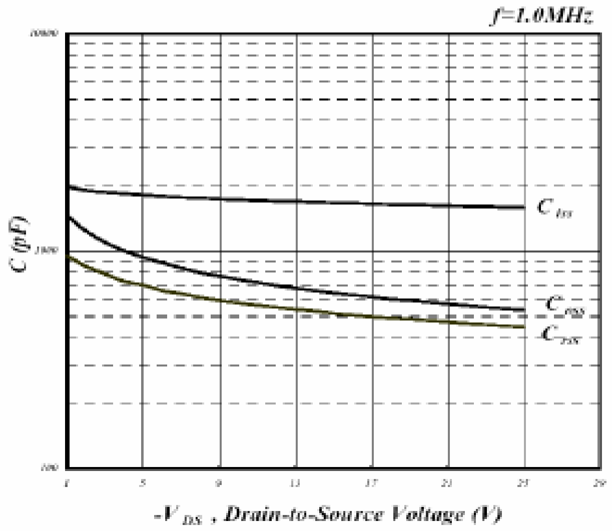


Fig 8. Typical Capacitance Characteristics

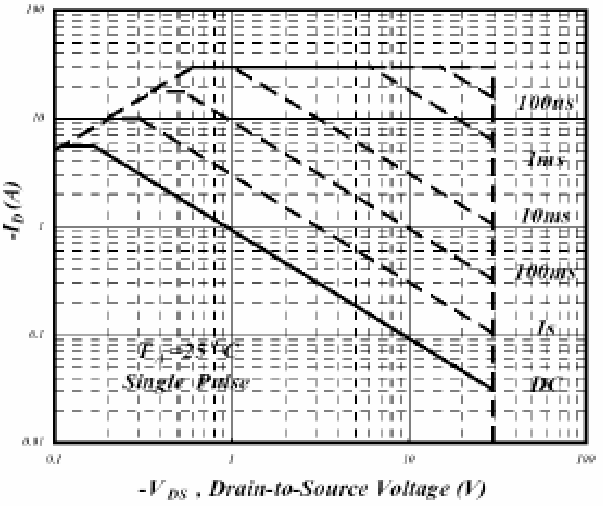


Fig 9. Maximum Safe Operating Area

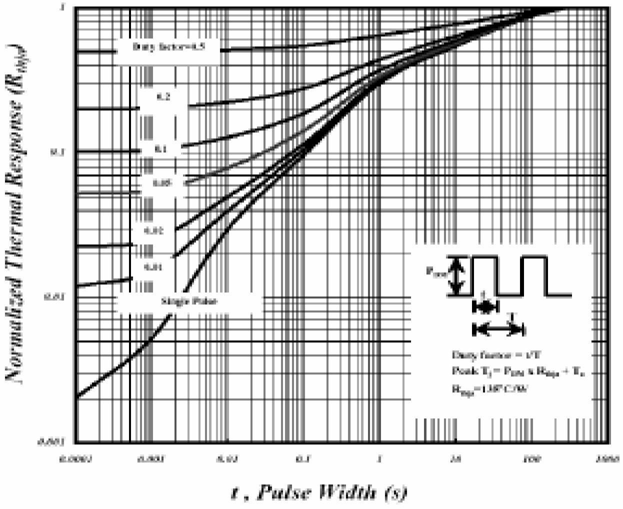


Fig 10. Effective Transient Thermal Impedance

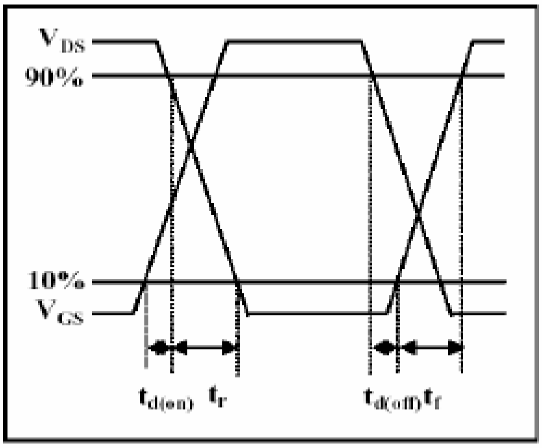


Fig 11. Switching Time Waveform

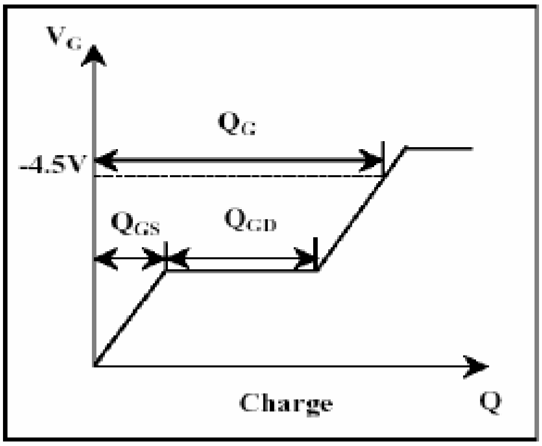
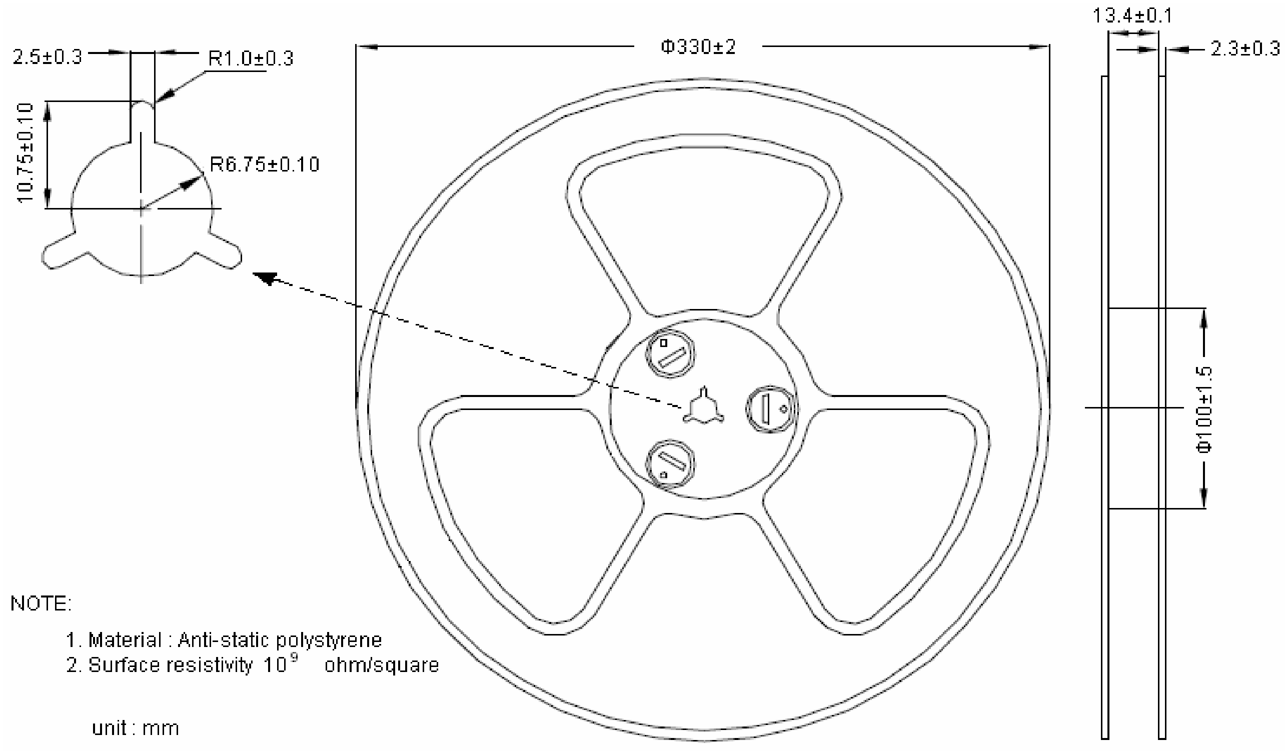


Fig 12. Gate Charge Waveform

Reel Dimension

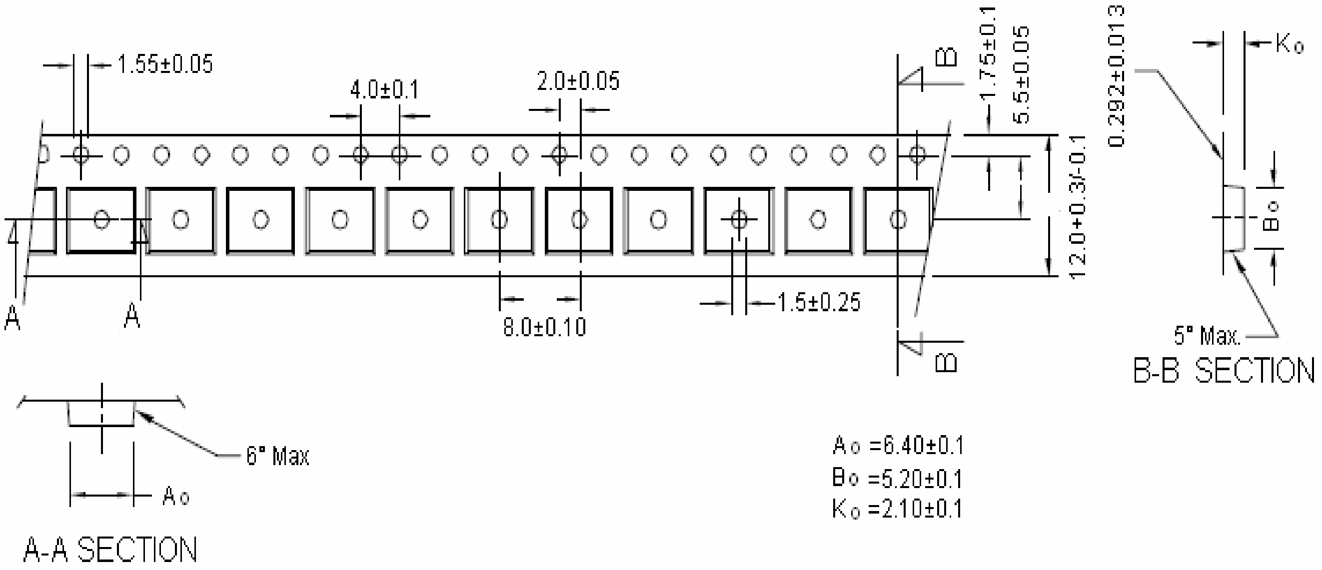


NOTE:

1. Material : Anti-static polystyrene
2. Surface resistivity 10^9 ohm/square

unit : mm

Carrier Tape Dimension



Ao =6.40±0.1
Bo =5.20±0.1
Ko =2.10±0.1

Notes:

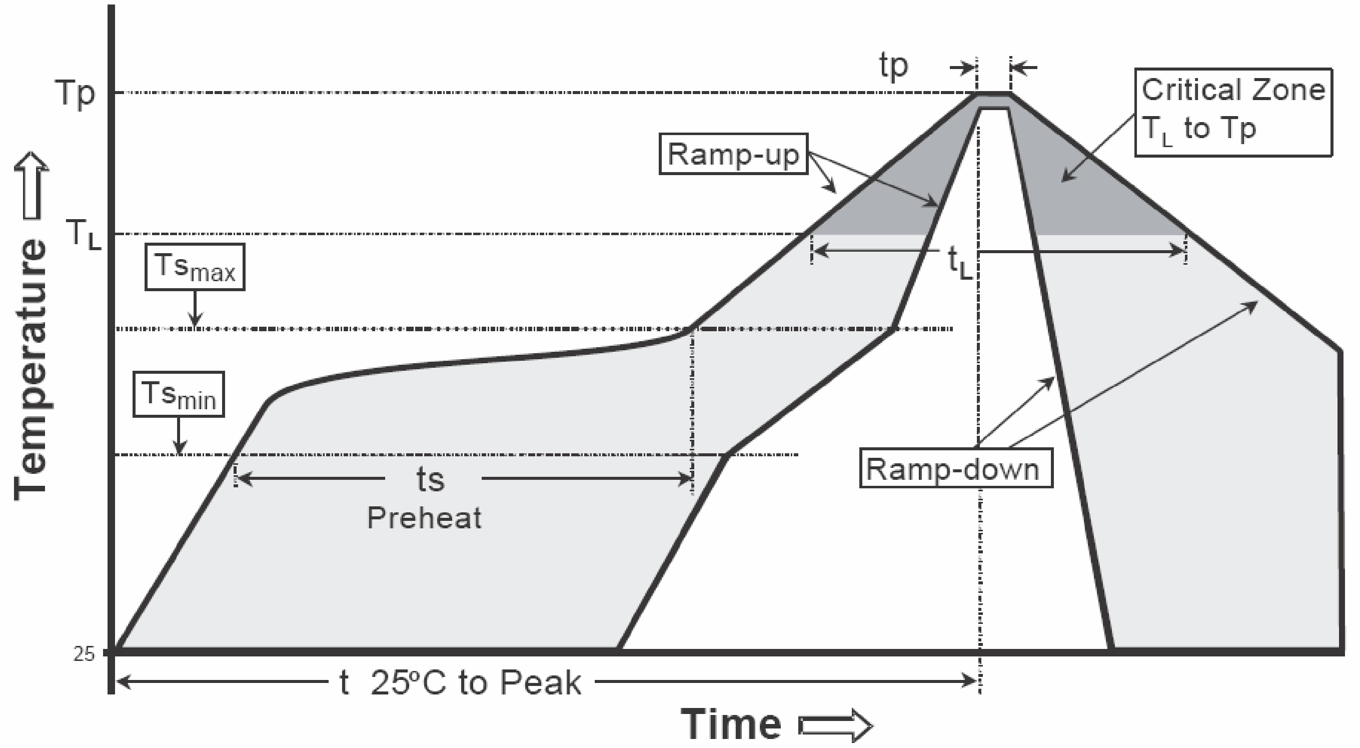
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Uni : millimeter

Recommended wave soldering condition

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

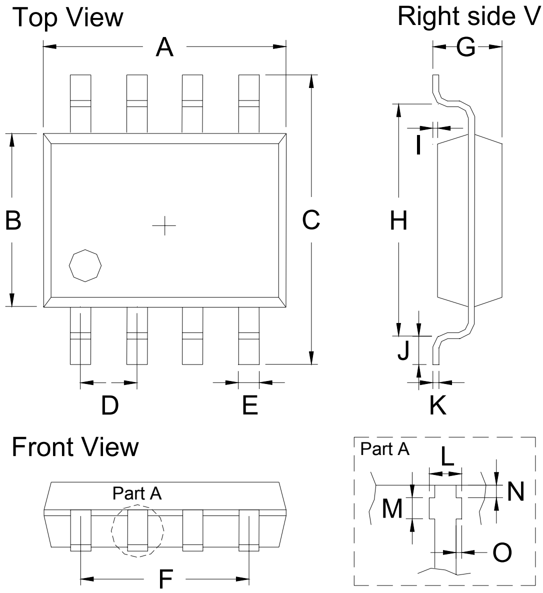
Recommended temperature profile for IR reflow

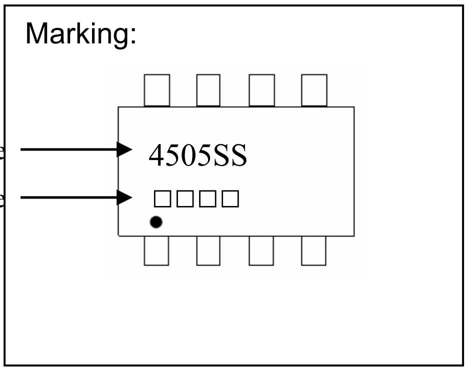


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts_{min} to ts_{max})	100°C 150°C 60-120 seconds	150°C 200°C 60-180 seconds
Time maintained above: −Temperature (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





8-Lead SOP-8 Plastic Package
CYStek Package Code: Q8

*: 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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