N- AND P-Channel Enhancement Mode MOSFET

MTC4503N8J

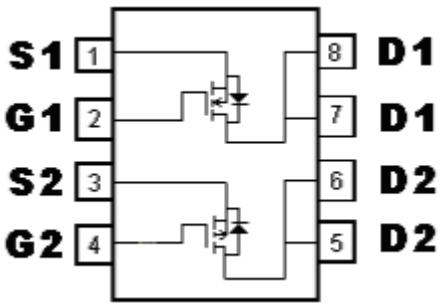
	N-CH	P-CH
BV_{DSS}	30V	-30V
I_D@V_{GS}=10V(-10V), T_A=25°C	6.3A	-5.2A
I_D@V_{GS}=10V(-10V), T_C=25°C	9.1A	-7.6A
R_{DSON}@V_{GS}=10V(-10V) typ.	14.4mΩ	23.2mΩ
R_{DSON}@V_{GS}=4.5V(-4.5V) typ.	19.1mΩ	32.3mΩ
R_{DSON}@V_{GS}=4V(-4V) typ.	21.7mΩ	37.4mΩ

Features

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

Equivalent Circuit

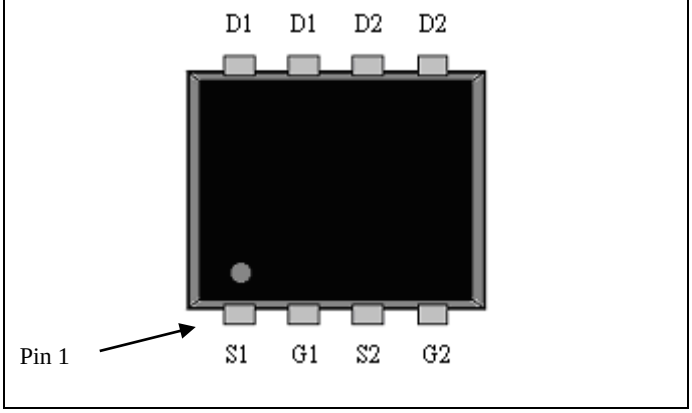
MTC4503N8J



G：Gate S：Source D：Drain

Outline

2928-8J



Ordering Information

Device	Package	Shipping
MTC4503N8J-0-T1-G	2928-8J (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, T1 : 3000 pcs / tape & reel,7" reel

Product rank, zero for no rank products

Product name

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	
Continuous Drain Current *2	T_A=25 °C, V_{GS}=10V (-10V)	I_{DSM}	6.3	-5.2	A
	T_A=70 °C, V_{GS}=10V (-10V)		5.0	-4.2	
Continuous Drain Current	T_C=25 °C, V_{GS}=10V (-10V)	I_D	9.1	-7.6	
	T_C=100 °C, V_{GS}=10V (-10V)		5.8	-4.8	
Pulsed Drain Current * 3		I_{DM}	36	-30	
Total Power Dissipation	T_A=25°C, Single device operation	P_{DSM}	1.5 *2		W
	T_A=70°C, Single device operation		0.96 *2		
	T_A=25°C, Single device value at dual operation		1.24 *2		
	T_A=70°C, Single device value at dual operation		0.79 *2		
	T_C=25°C	P_D * 1	3.1		
	T_C=100°C		1.2		
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150		°C

Thermal Data

Parameter	Symbol	Value	Unit
Max. Thermal Resistance, Junction-to-ambient, single device operation	$R_{th,j-a}$	84 *2	°C/W
Max. Thermal Resistance, Junction-to-ambient, single device value at dual operation		101 *2	
Max. Thermal Resistance, Junction-to-case	$R_{th,j-c}$	40	

Note : 1. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C, t≤5s. 216°C/W when mounted on a minimum pad of 2 oz. copper. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design.

3. Pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low duty cycles to keep initial T_J=25°C.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	30	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1	-	2.5		V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=24V, V_{GS}=0V
	-	-	10		V_{DS}=24V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	14.4	19	mΩ	V_{GS}=10V, I_D=6A
	-	19.1	26		V_{GS}=4.5V, I_D=6A
	-	21.7	35		V_{GS}=4V, I_D=6A
*G_{FS}	-	5.4	-	S	V_{DS}=10V, I_D=3A

Dynamic					
Ciss	-	521	-	pF	V_{DS}=10V, V_{GS}=0V, f=1MHz
Coss	-	90	-		
Crss	-	72	-		
*$t_{d(ON)}$	-	5.6	-	ns	V_{DS}=15V, I_D=3A, V_{GS}=10V, R_G=10Ω
*t_r	-	16	-		
*$t_{d(OFF)}$	-	31	-		
*t_f	-	9.4	-		
*Qg	-	6.9	-	nC	V_{DS}=15V, I_D=6A, V_{GS}=5V
*Qgs	-	1.6	-		
*Qgd	-	2.6	-		
Body Diode					
*V_{SD}	-	0.85	1.2	V	V_{GS}=0V, I_S=6A
*trr	-	7.2	-	ns	I_F=6A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	3.0	-	nC	

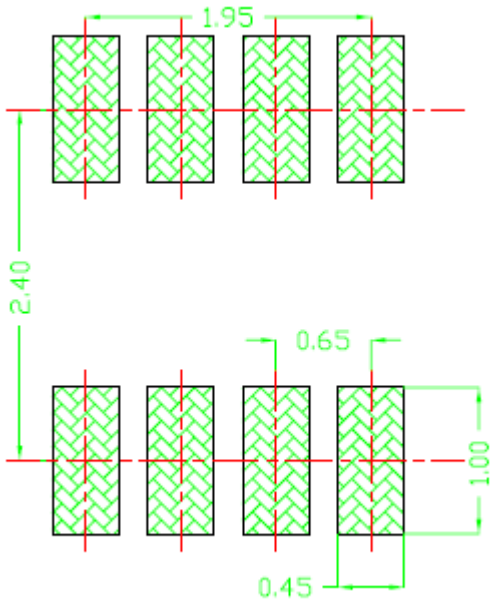
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-30	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-1	-	-2.5		V_{DS}=V_{GS}, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-24V, V_{GS}=0V
	-	-	-10		V_{DS}=-24V, V_{GS}=0V, Tj=70°C
*$R_{DS(ON)}$	-	23.2	34	mΩ	V_{GS}=-10V, I_D=-5A
	-	32.3	47		V_{GS}=-4.5V, I_D=-2.5A
	-	37.4	60		V_{GS}=-4V, I_D=-2.5A
*G_{FS}	-	6.2	-	S	V_{DS}=-10V, I_D=-3A
Dynamic					
Ciss	-	947	-	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	131	-		
Crss	-	109	-		
*$t_{d(ON)}$	-	6.8	-	ns	V_{DS}=-15V, I_D=-3.5A, V_{GS}=-10V, R_G=10Ω
*tr	-	16.8	-		
*$t_{d(OFF)}$	-	93.4	-		
*tf	-	48.2	-		
*Qg	-	10.7	-	nC	V_{DS}=-15V, I_D=-7A, V_{GS}=-5V
*Qgs	-	3.1	-		
*Qgd	-	3.9	-		
Body Diode					
*V_{SD}	-	-0.85	-1.2	V	V_{GS}=0V, I_S=-5A
*trr	-	9.3	-	ns	I_F=-7A, V_{GS}=0V, dI_F/dt=100A/μs
*Qrr	-	4.3	-	nC	

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

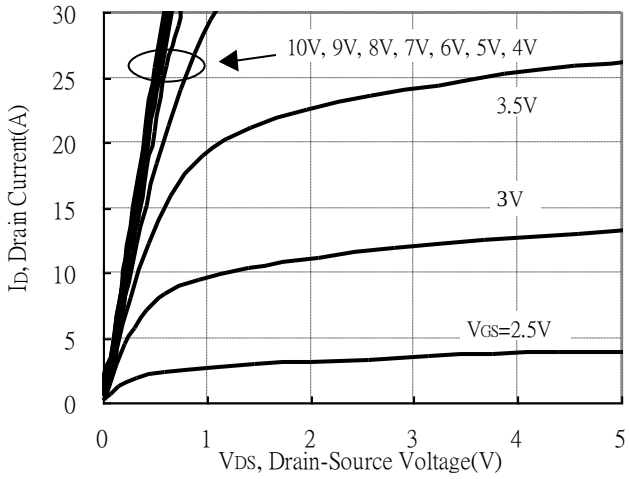
Recommended Soldering Footprint



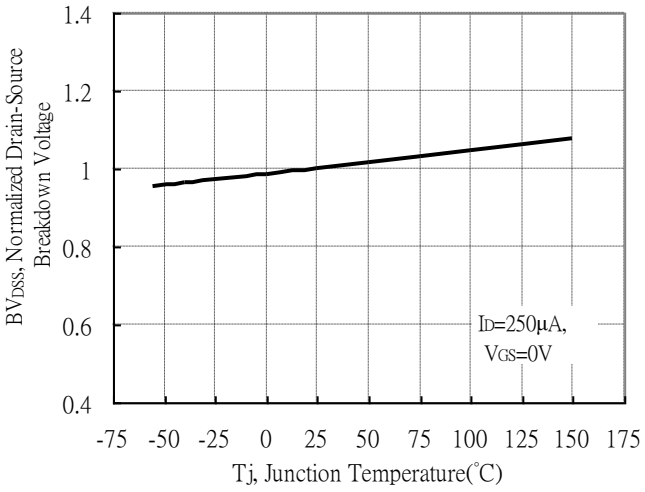
unit : mm

Typical Characteristics : Q1(N-channel)

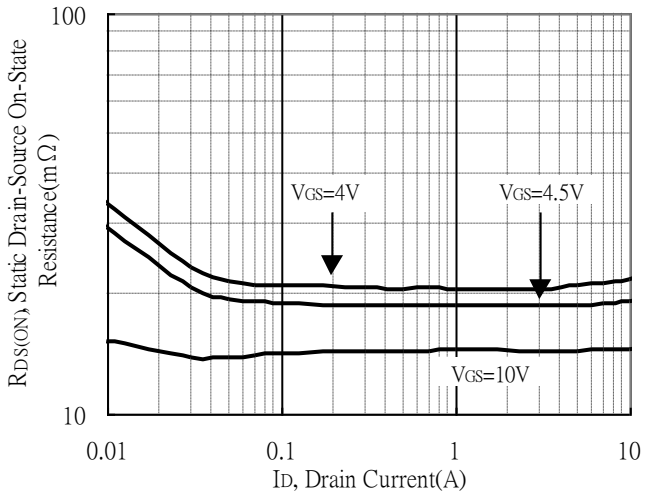
Typical Output Characteristics



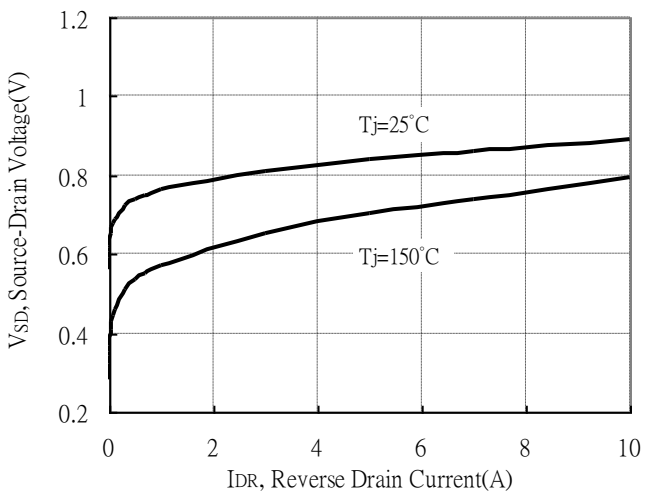
Brekdown Voltage vs Ambient Temperature



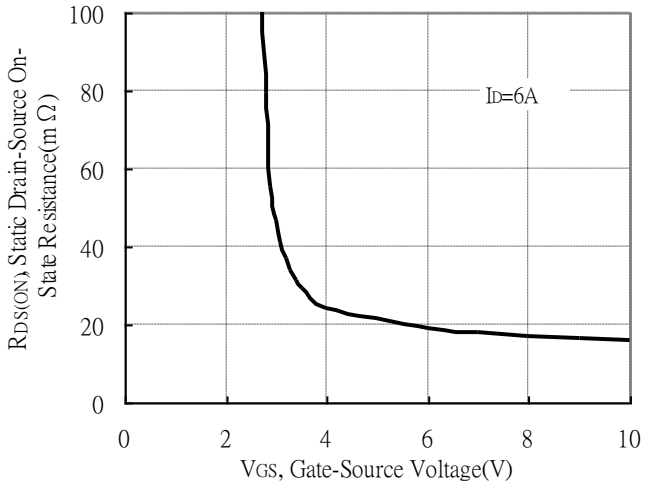
Static Drain-Source On-State resistance vs Drain Current



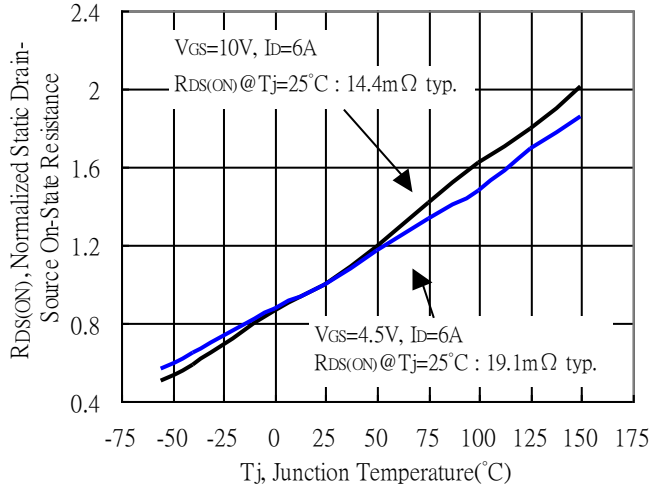
Reverse Drain Current vs Source-Drain Voltage



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

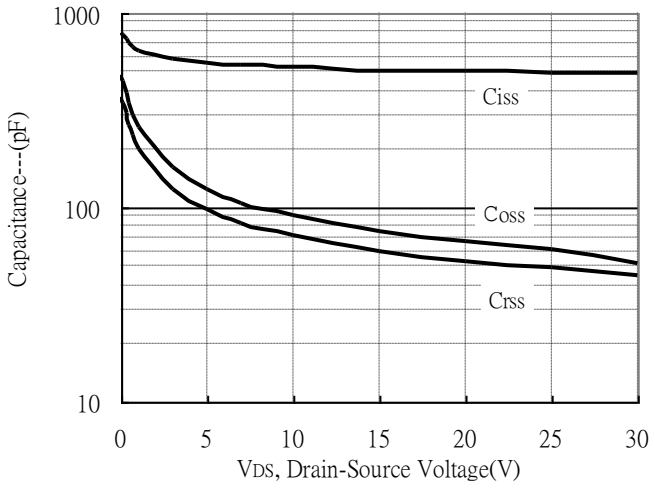


Drain-Source On-State Resistance vs Junction Tempearture

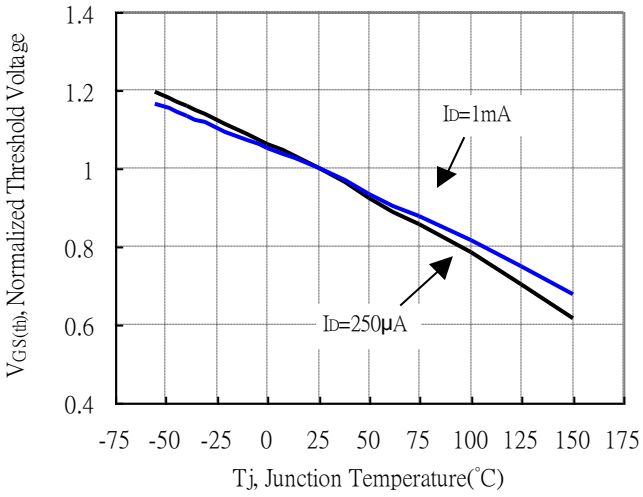


Typical Characteristics(Cont.) : Q1(N-channel)

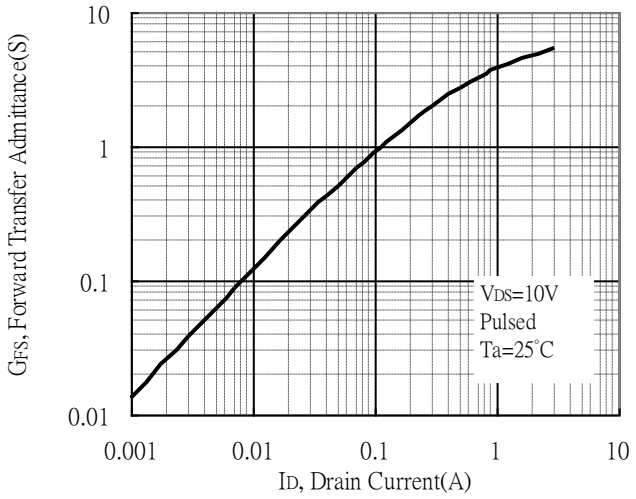
Capacitance vs Drain-to-Source Voltage



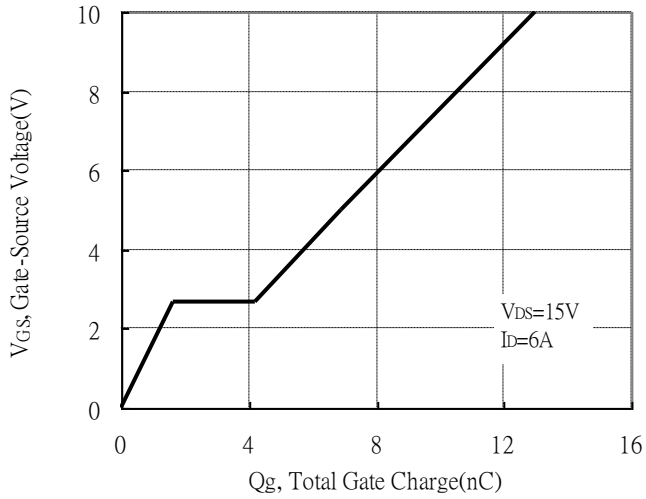
Threshold Voltage vs Junction Tempearture



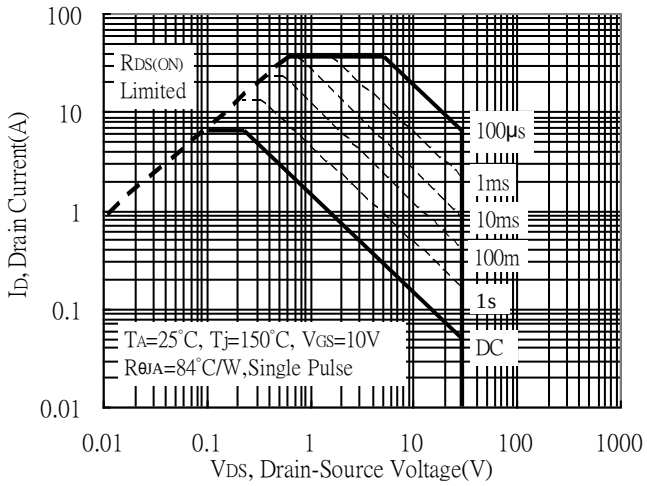
Forward Transfer Admittance vs Drain Current



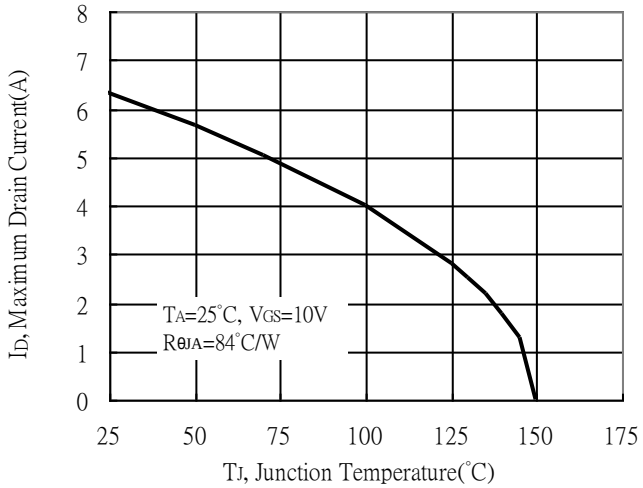
Gate Charge Characteristics



Maximum Safe Operating Area

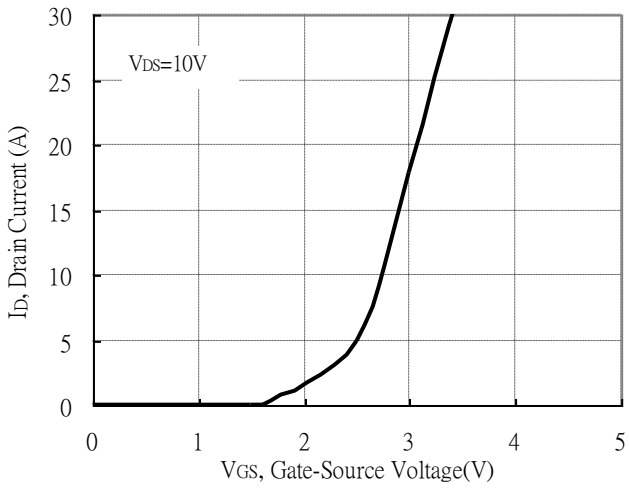


Maximum Drain Current vs Junction Temperature

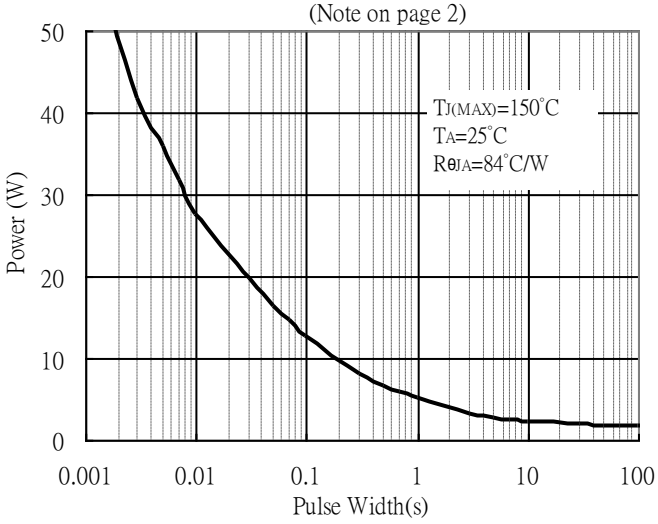


Typical Characteristics(Cont.) : Q1(N-channel)

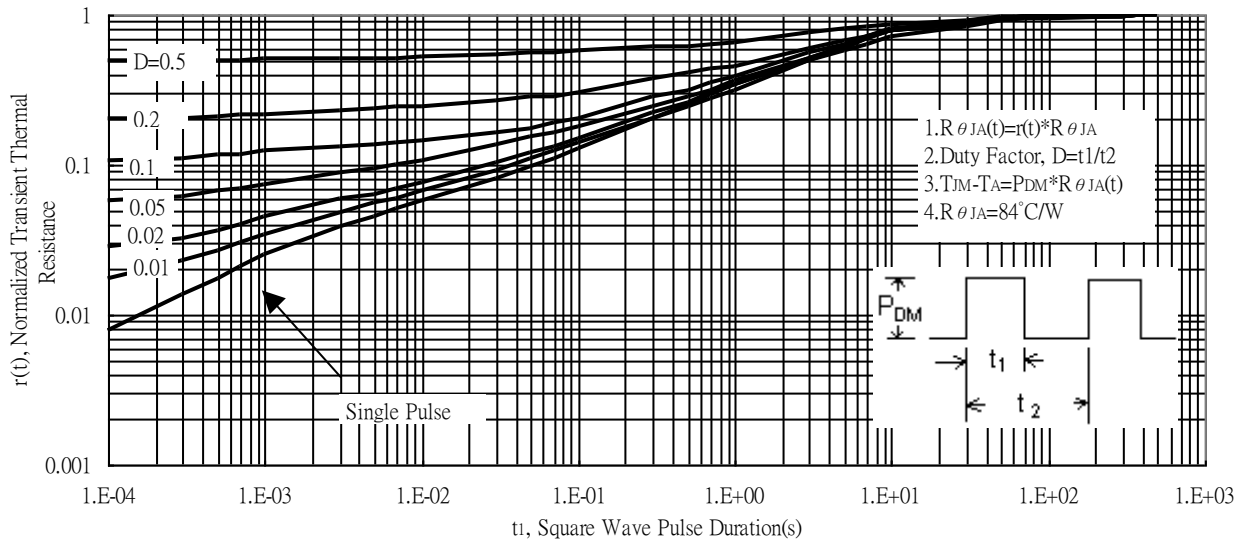
Typical Transfer Characteristics



Single Pulse Power Rating, Junction to Ambient
(Note on page 2)

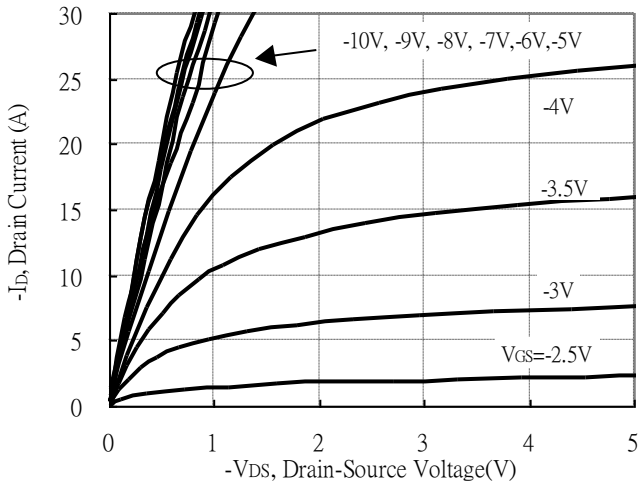


Transient Thermal Response Curves

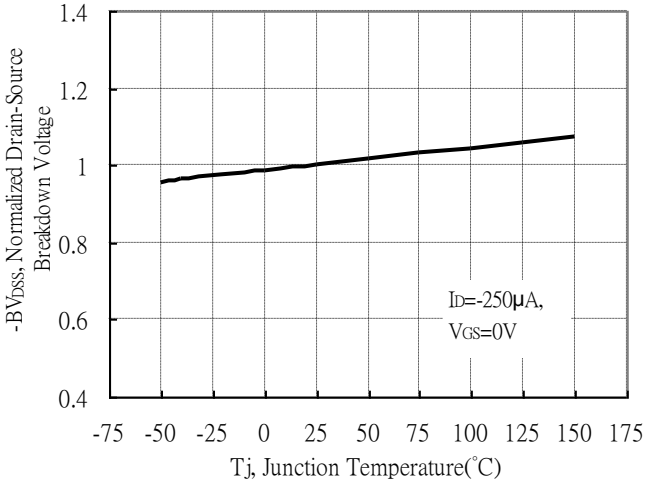


Typical Characteristics : Q2(P-channel)

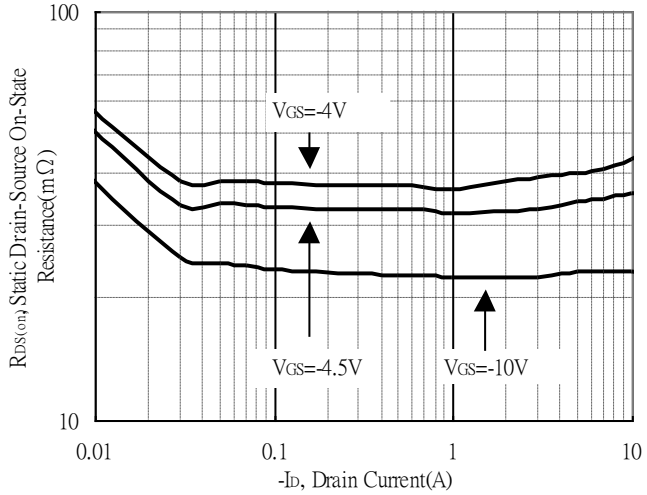
Typical Output Characteristics



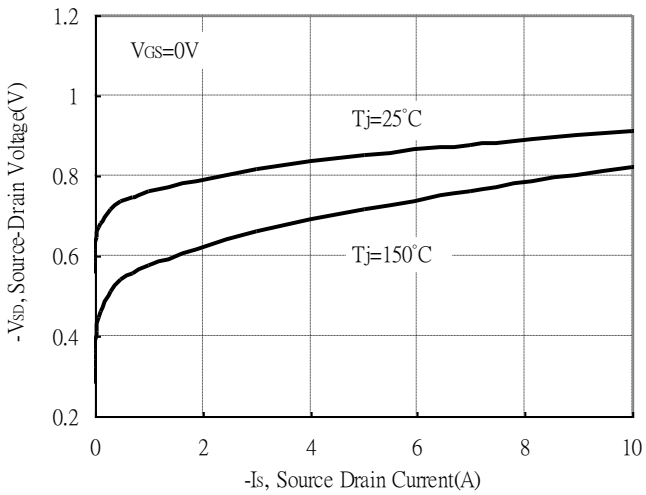
Brekdown Voltage vs Ambient Temperature



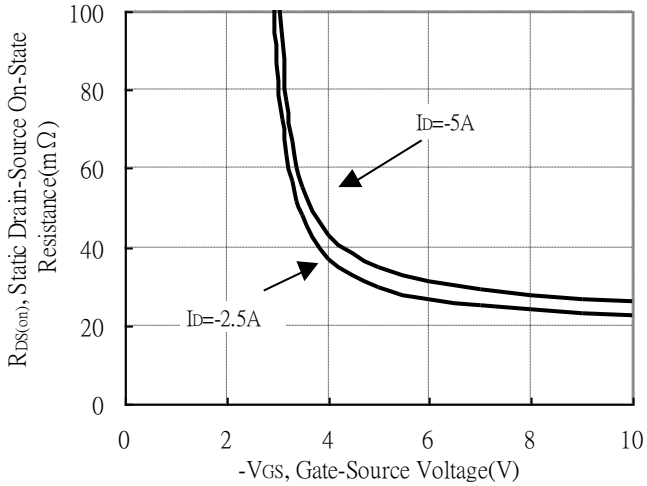
Static Drain-Source On-State resistance vs Drain Current



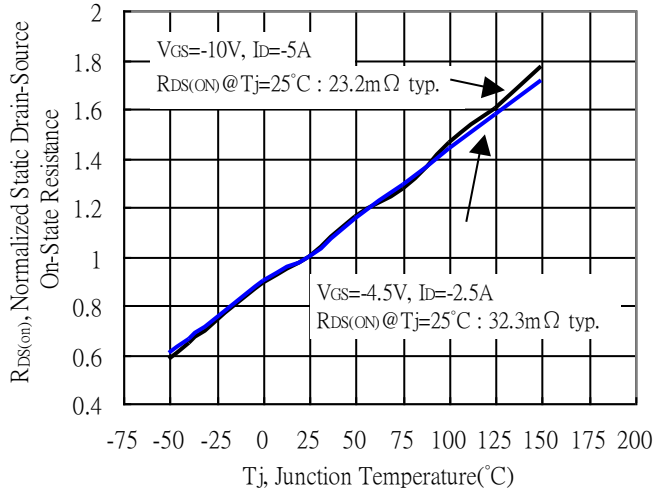
Source Drain Current vs Source-Drain Voltage



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

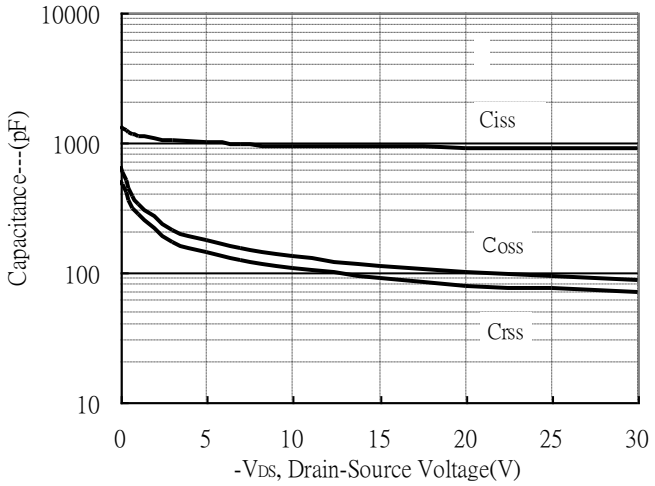


Drain-Source On-State Resistance vs Junction Tempearture

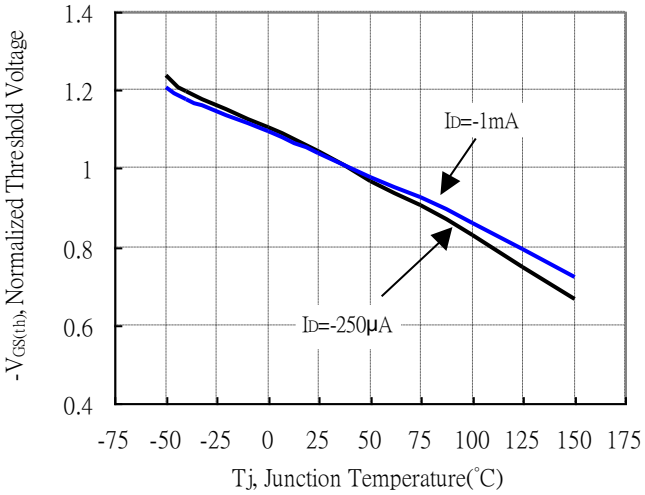


Typical Characteristics(Cont.) : Q2(P-channel)

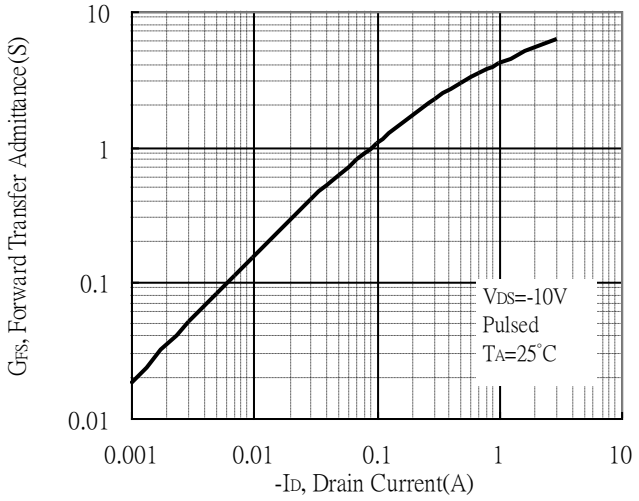
Capacitance vs Drain-to-Source Voltage



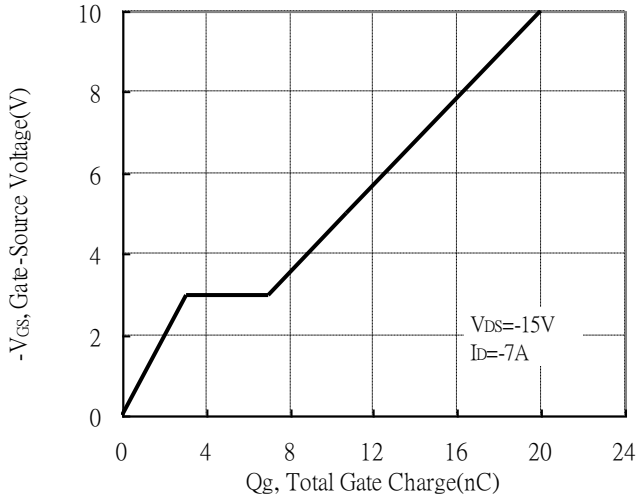
Threshold Voltage vs Junction Tempearture



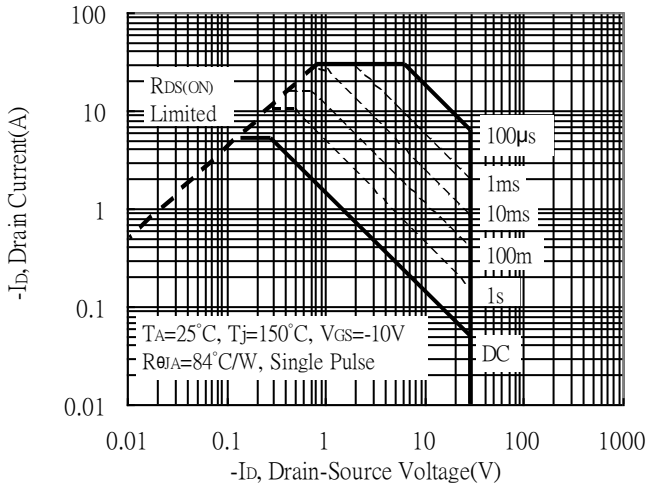
Forward Transfer Admittance vs Drain Current



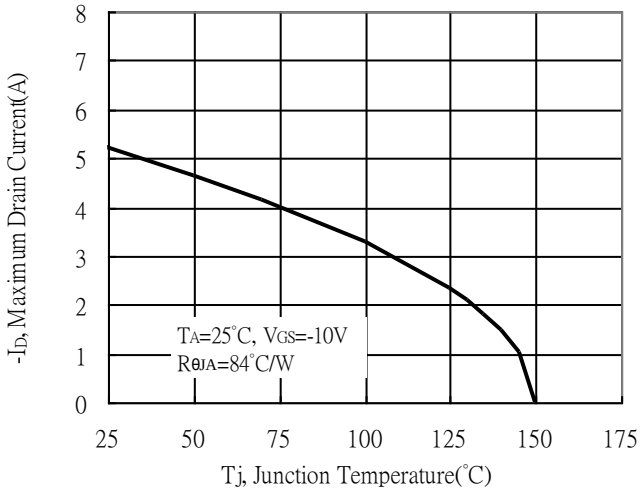
Gate Charge Characteristics



Maximum Safe Operating Area

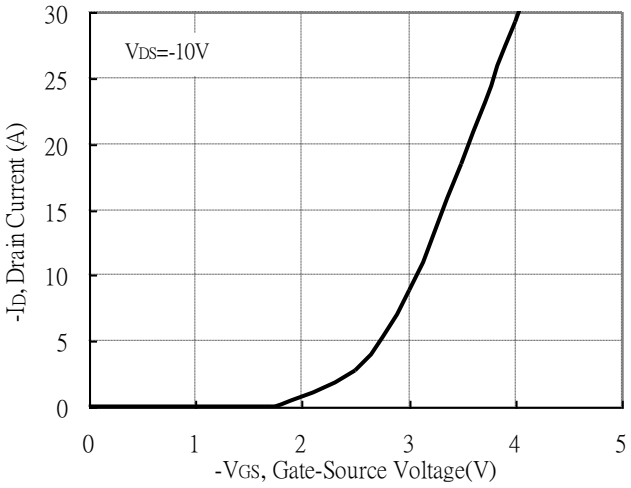


Maximum Drain Current vs Junction Temperature

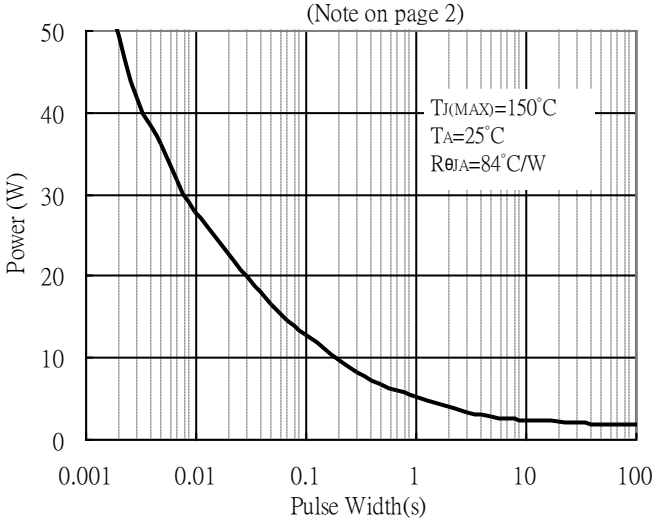


Typical Characteristics(Cont.) : Q2(P-channel)

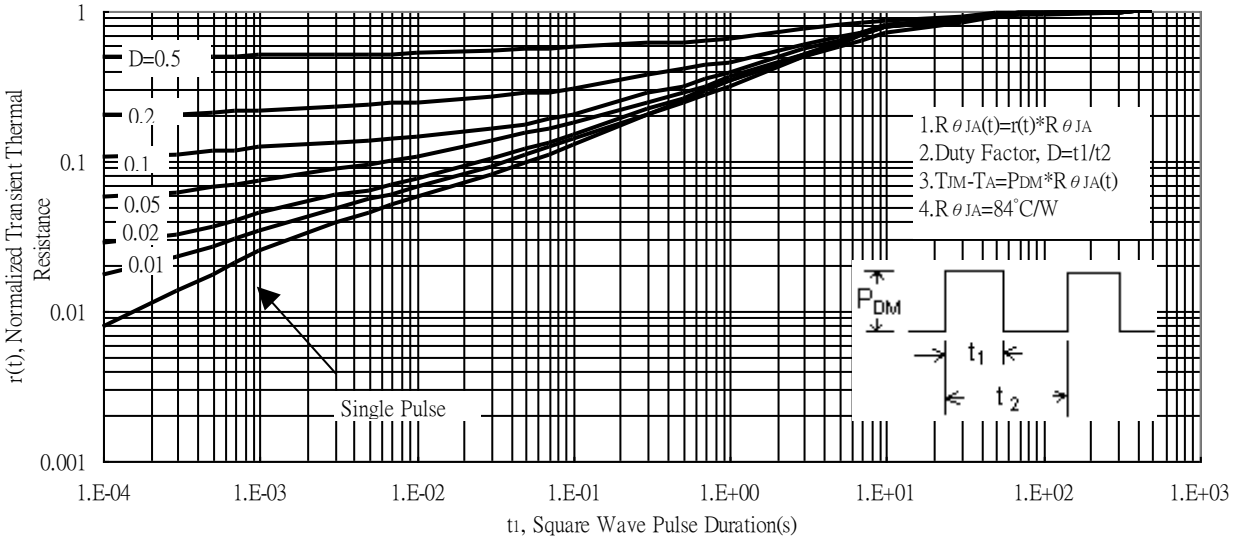
Typical Transfer Characteristics



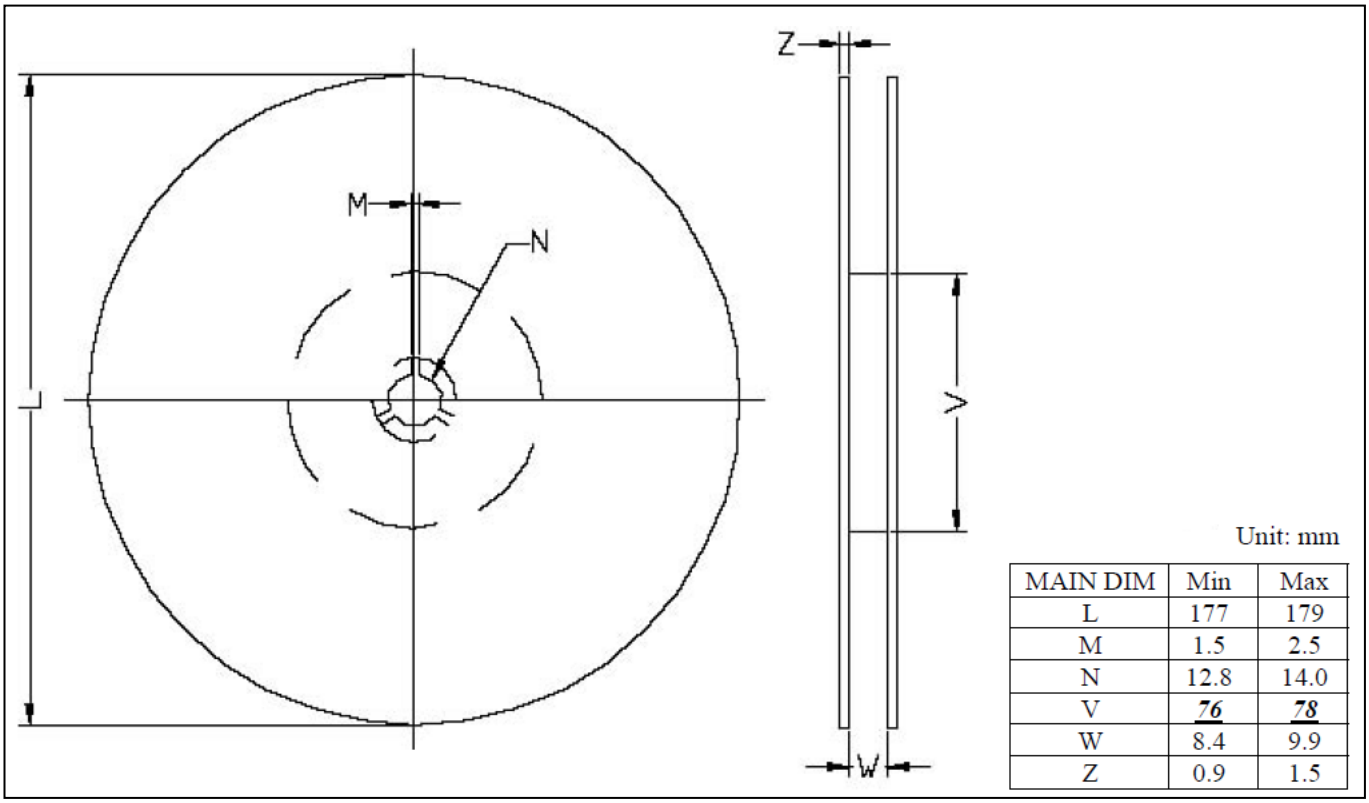
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



Transient Thermal Response Curves



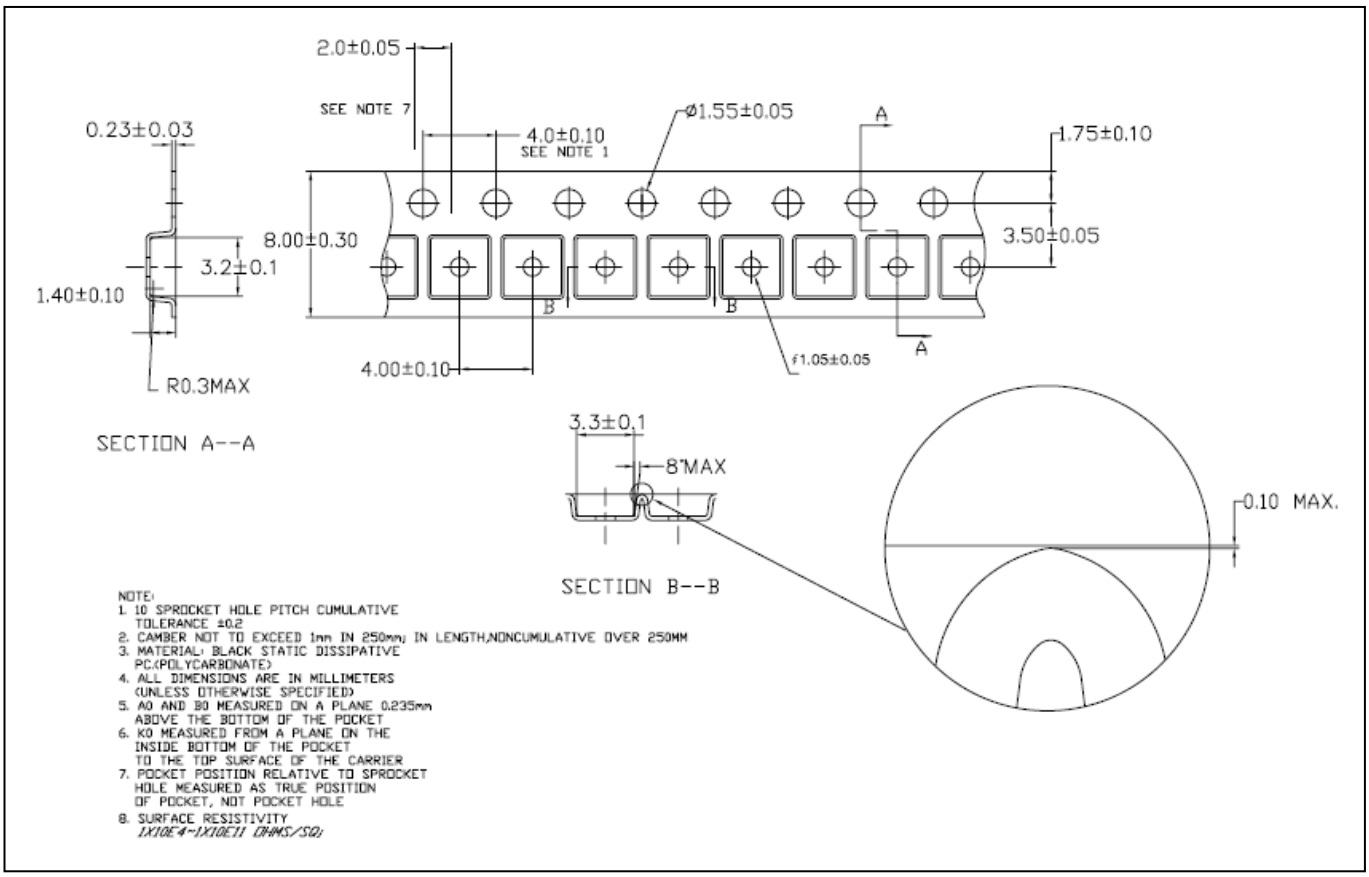
Reel Dimension



Unit: mm

MAIN DIM	Min	Max
L	177	179
M	1.5	2.5
N	12.8	14.0
V	***76***	***78***
W	8.4	9.9
Z	0.9	1.5

Carrier Tape Dimension

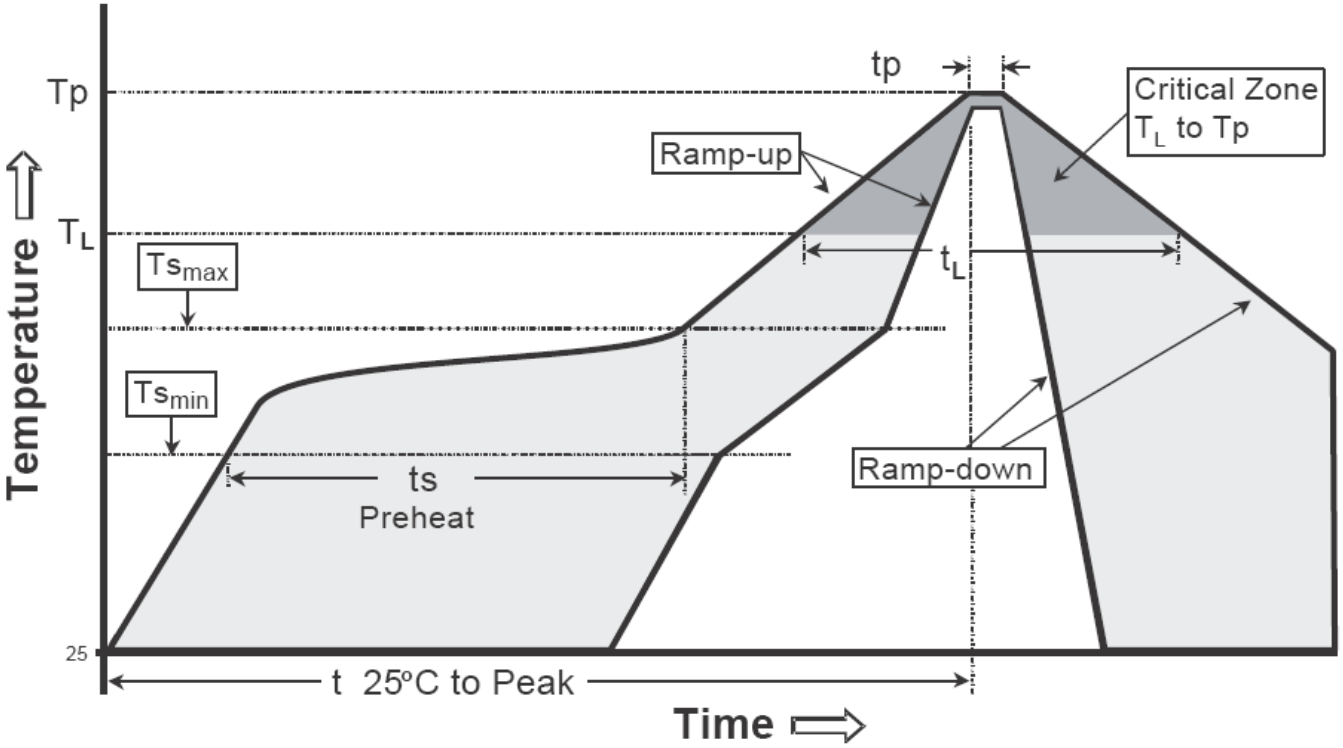


NOTE:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER NOT TO EXCEED 1mm IN 250mm; IN LENGTH,NONCUMULATIVE OVER 250MM
3. MATERIAL: BLACK STATIC DISSIPATIVE PC.(POLYCARBONATE)
4. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED)
5. A0 AND B0 MEASURED ON A PLANE 0.235mm ABOVE THE BOTTOM OF THE POCKET
6. K0 MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
7. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE
8. SURFACE RESISTIVITY
1X10E4~1X10E11 OHMS/SQ

Recommended wave soldering condition

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

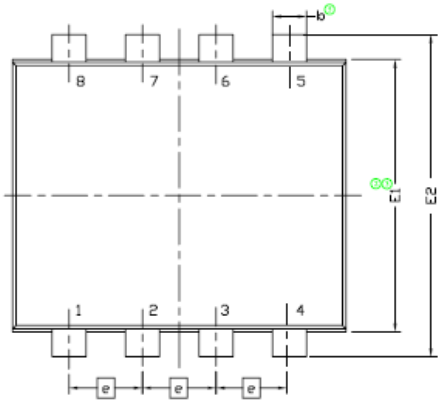
Recommended temperature profile for IR reflow

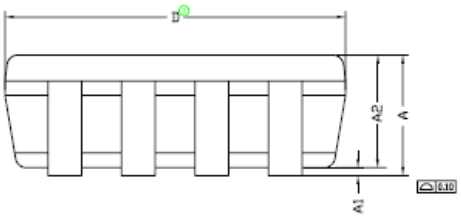


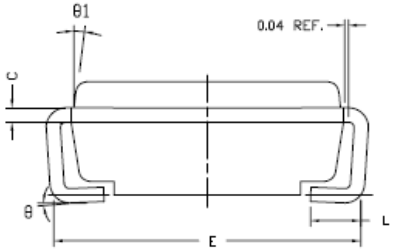
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(Ts min) −Temperature Max(Ts max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	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 :1. All temperatures refer to topside of the package, measured on the package body surface.
2.For devices mounted on FR-4 PCB of 1.6mm or equivalent grade PCB. If other grade PCB is used, care should be taken to match the coefficients of thermal expansion between components and PCB. If they are not matched well, the solder joints may crack or the bodies of the parts may crack or shatter as the assembly cools.

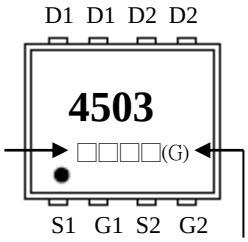
2928-8J Dimension







Marking:



Assembly site code :
blank →JCET
G→GEM

8-Lead 2928-8J Plastic Package
CYStek Package Code: N8J

Date Code(counting from left to right) :
1st code: year code, the last digit of Christian year
2nd code : month code, Jan→A, Feb→B, Mar→C,
Apr→D, May→E, Jun→F, Jul→G, Aug→H,
Sep→J, Oct→K, Nov→L, Dec→M
3rd and 4th codes : production serial number, 01~99

Note:
1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
Mold Flash, Protrusion Or Gate Burrs Shall Not Exceed 0.10 mm Per Side.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.
4. The Package Top May Be Smaller Than The Package Bottom.
5. Dimension "b" Does Not Include Dambar Protrusion. Allowable Dambar Protrusion Shall Be 0.08 mm Total In Excess Of "b" Dimension At Maximum Material Condition. The Dambar Cannot Be Located On The Lower Radius Of The Foot.

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.935	1.100	0.0368	0.0433	E1	2.300	2.500	0.0906	0.0984
A1	0.010	0.100	0.0004	0.0039	E2	2.650	3.050	0.1043	0.1201
A2	0.925	1.000	0.0364	0.0394	e	0.65 BSC		0.0256 BSC	
b	0.250	0.400	0.0098	0.0157	L	0.300	0.600	0.0118	0.0236
c	0.100	0.200	0.0039	0.0079	θ	0°	8°	0°	8°
D	2.950	3.100	0.1161	0.1220	θ1	7° TYP		7° TYP	
E	2.500	3.000	0.0984	0.1181					

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.