Asymmetric Dual N-Channel Enhancement Mode MOSFET

MTNN783803ARSH8

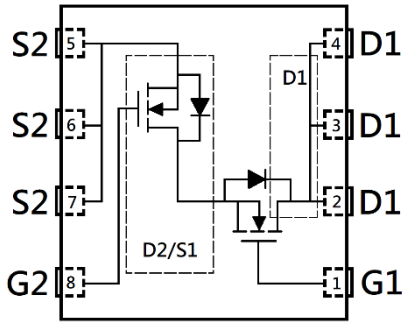
Features

- Low On Resistance
- Low On Resistance
- Fast Switching Characteristic
- Power Management in DC/DC Converters

	TR1	TR2
BV_{DSS}	30V	30V
I_D@V_{GS}=10V, T_C=25°C	27A	36A
I_D@V_{GS}=10V, T_A=25°C	13A	17A
$R_{DS(ON)}$ typ. @V_{GS}=10V	6.5mΩ	3.4mΩ
$R_{DS(ON)}$ typ. @V_{GS}=4.5V	10.5mΩ	4.8mΩ

Equivalent Circuit

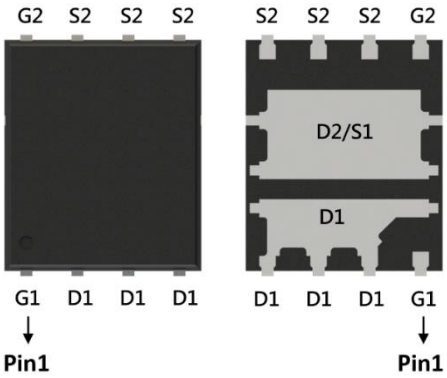
MTNN783803ARSH8



D2 and S1 are connected to the bottom side

Outline

DFN5×6



Ordering Information

Device	Package	Shipping
MTNN783803ARSH8-0-T6-G	DFN5×6 (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, T6 : 3000 pcs / tape & reel,13” reel
- Product rank, zero for no rank products
- Product name

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits		Unit
			TR1	TR2	
Drain-Source Voltage		V_{DS}	30	30	V
Gate-Source Voltage		V_{GS}	±20	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (silicon limit)	*a	I_D	44	75	A
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (package limit)	*a		27	36	
Continuous Drain Current @ V_{GS}=10V, T_C=100°C	*a		27	36	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C	*b		13	17	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C	*b		10	14	
Pulsed Drain Current	*c	I_{DM}	108	144	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	25	36	
Avalanche Current @ L=0.1mH		I_{AS}	13	18	
Avalanche Energy @ L=0.5mH		E_{AS}	12	25	mJ
Total Power Dissipation	T_C=25°C *a	P_D	30	48	W
	T_C=100°C *a		12	19	
	T_A=25°C *b		2.5	2.5	
	T_A=70°C *b		1.6	1.6	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150		°C

Thermal Data

Parameter		Symbol	Steady State		Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	4.2	2.6	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	50	50	

Note:

*a. 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.

*b. 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. The power dissipation P_D 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.

*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

TR1 Electrical Characteristics (T_A=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
G_{FS}	-	12	-	S	V_{DS}=5V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=24V, V_{GS}=0V
$R_{DS(ON)}$	-	6.5	8.4	mΩ	V_{GS}=10V, I_D=10A
	-	10.5	15		V_{GS}=4.5V, I_D=8A
Dynamic					
Ciss	-	580	-	pF	V_{DS}=15V, V_{GS}=0V, f=1MHz
Coss	-	410	-		
Crss	-	55	-		
Rg	-	0.7	-	Ω	f=1MHz
Qg *1, 2	-	10.5	-	nC	V_{DS}=15V, I_D=10A, V_{GS}=10V
Qgs *1, 2	-	2.1	-		
Qgd *1, 2	-	2	-		
$t_{d(ON)}$ *1, 2	-	6.7	-	ns	V_{DS}=15V, I_D=10A, V_{GS}=10V, R_{GS}=1Ω
tr *1, 2	-	13	-		
$t_{d(OFF)}$ *1, 2	-	20	-		
t_f *1, 2	-	5.5	-		
Source-Drain Diode					
V_{SD} *1	-	0.85	1.2	V	I_S=10A, V_{GS}=0V
trr	-	15	-	ns	I_F=10A, dI_F/dt=100A/μs
Qrr	-	4	-	nC	

Note:

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

*2. Independent of operating temperature

TR2 Electrical Characteristics (T_A=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
G_{FS}	-	15	-	S	V_{DS}=10V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=24V, V_{GS}=0V
$R_{DS(ON)}$	-	3.4	4.5	mΩ	V_{GS}=10V, I_D=15A
	-	4.8	6.7		V_{GS}=4.5V, I_D=10A
Dynamic					
Ciss	-	1280	-	pF	V_{DS}=15V, V_{GS}=0V, f=1MHz
Coss	-	860	-		
Crss	-	116	-		
Rg	-	1	-	Ω	f=1MHz
Qg *1, 2	-	23	-	nC	V_{DS}=15V, I_D=15A, V_{GS}=10V
Qgs *1, 2	-	4	-		
Qgd *1, 2	-	4.5	-		
$t_{d(ON)}$ *1, 2	-	12	-	ns	V_{DS}=15V, I_D=15A, V_{GS}=10V, R_{GS}=6Ω
tr *1, 2	-	14	-		
$t_{d(OFF)}$ *1, 2	-	39	-		
t_f *1, 2	-	10	-		
Source-Drain Diode					
V_{SD} *1	-	0.83	1.2	V	I_S=15A, V_{GS}=0V
trr	-	30	-	ns	I_F=15A, dI_F/dt=100A/μs
Qrr	-	16	-	nC	

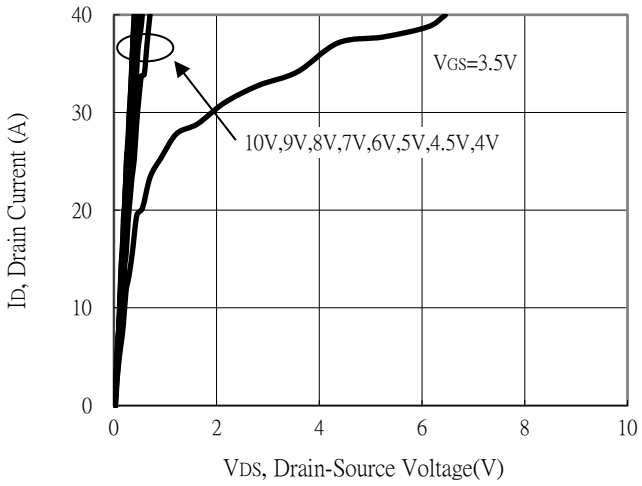
Note:

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

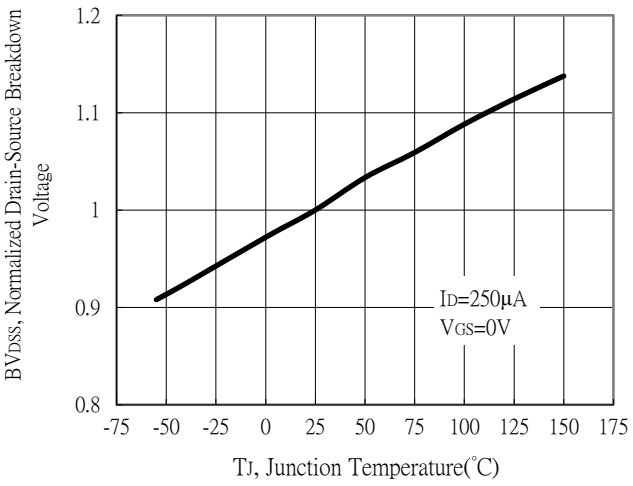
*2. Independent of operating temperature

Typical Characteristics : TR1(N-channel)

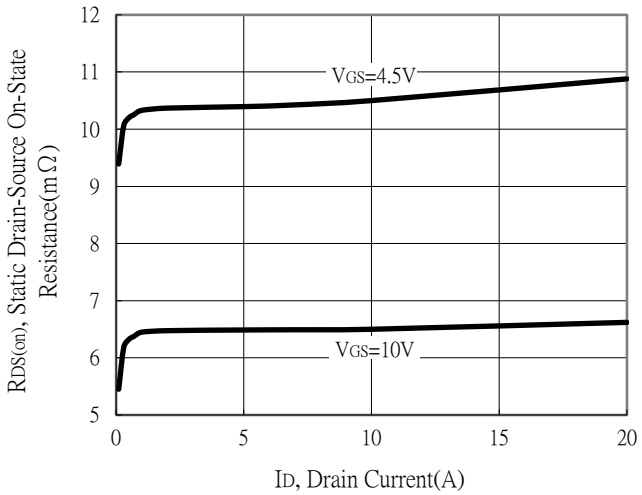
Typical Output Characteristics



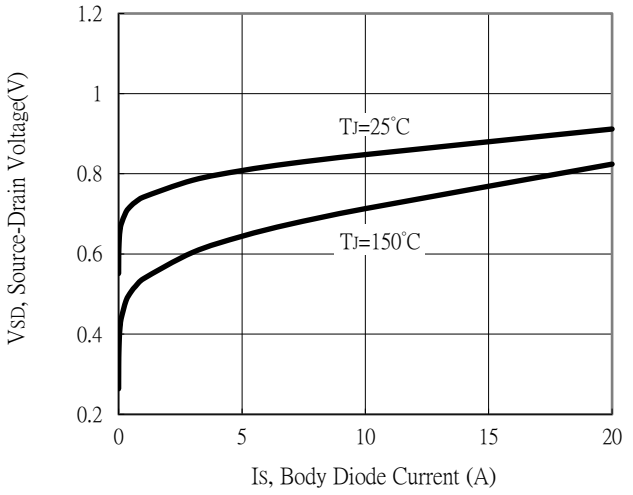
Breakdown Voltage vs Ambient Temperature



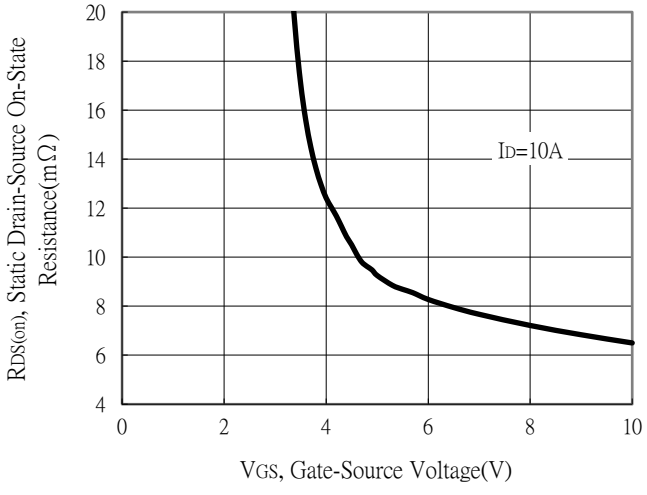
Static Drain-Source On-State resistance vs Drain Current



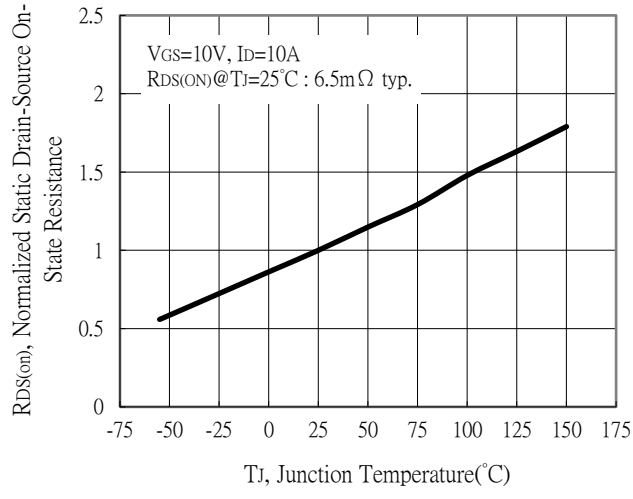
Body Diode Current vs Source-Drain Voltage



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

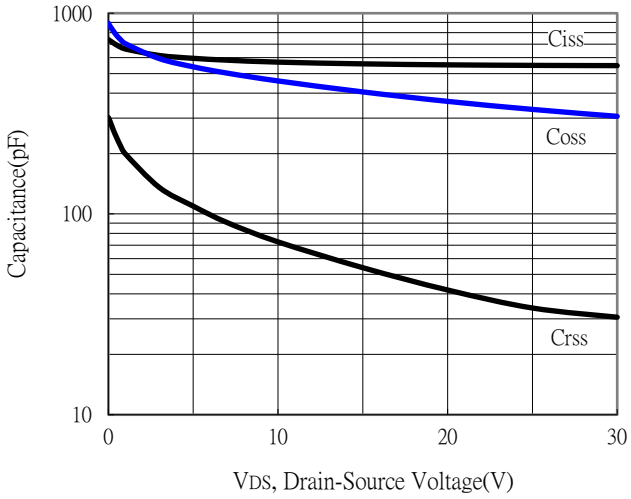


Drain-Source On-State Resistance vs Junction Temperature

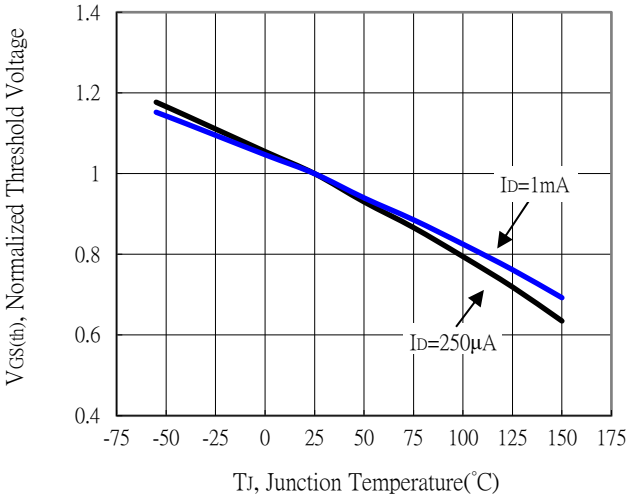


Typical Characteristics (Cont.) : TR1(N-channel)

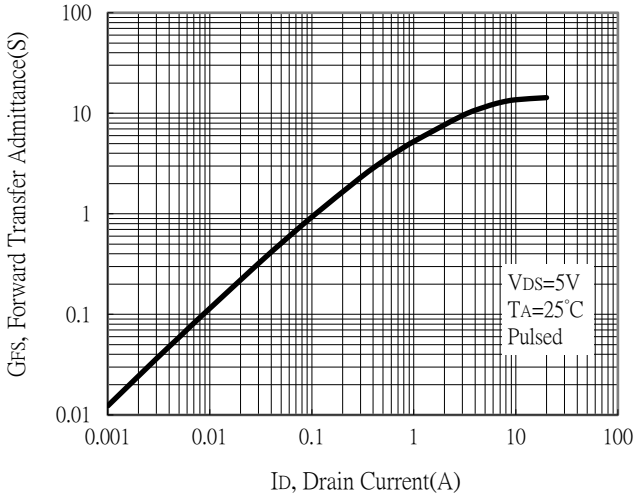
Capacitance vs Drain-to-Source Voltage



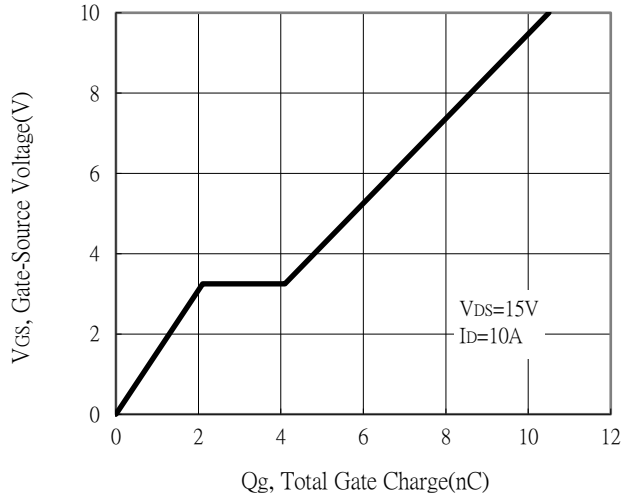
Threshold Voltage vs Junction Temperature



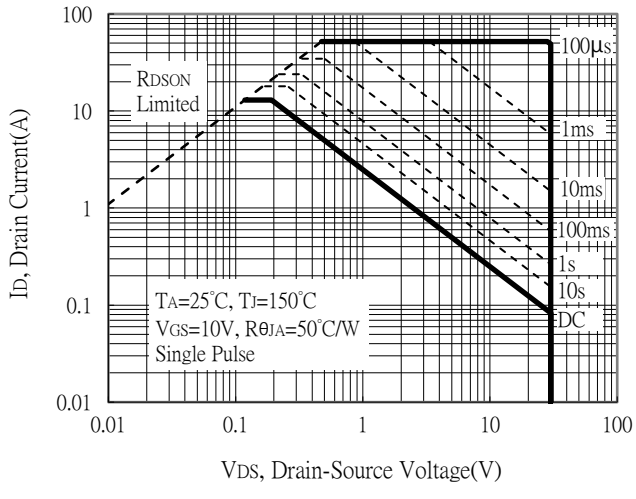
Forward Transfer Admittance vs Drain Current



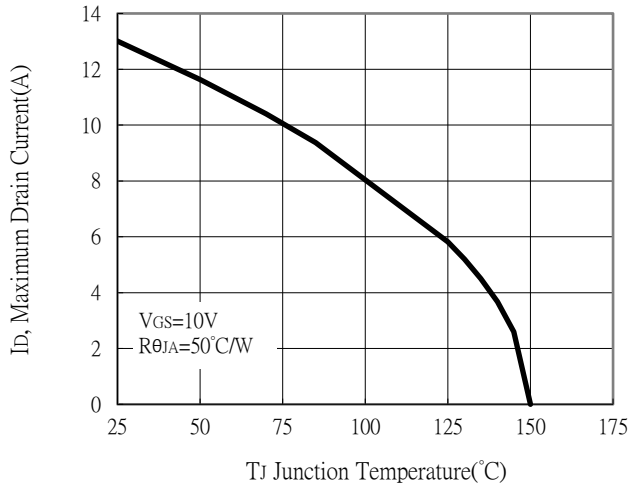
Gate Charge Characteristics



Maximum Safe Operating Area

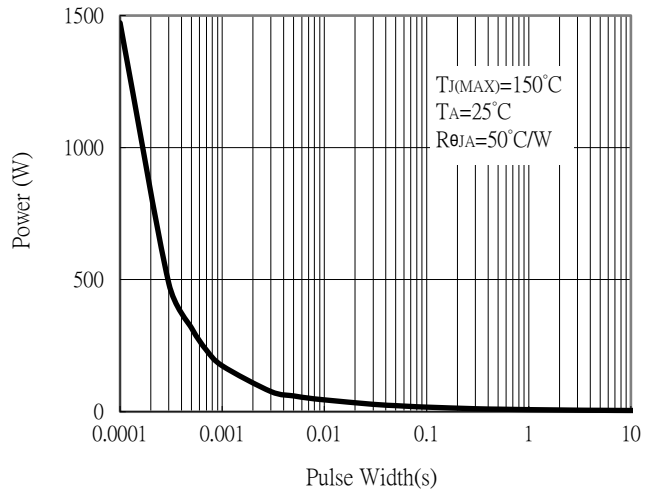


Maximum Drain Current vs Junction Temperature

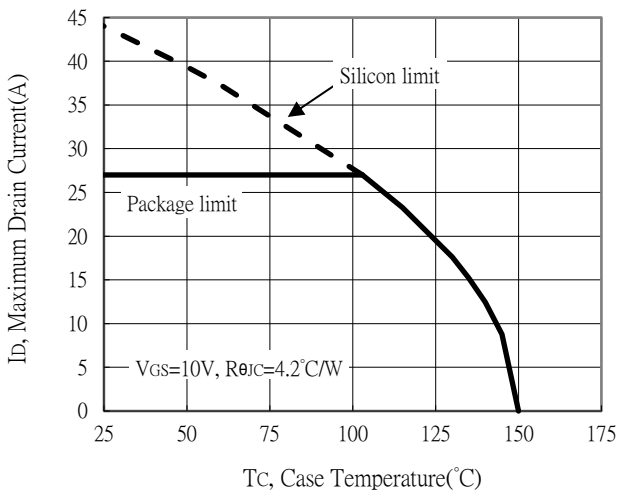


Typical Characteristics (Cont.) : TR1(N-channel)

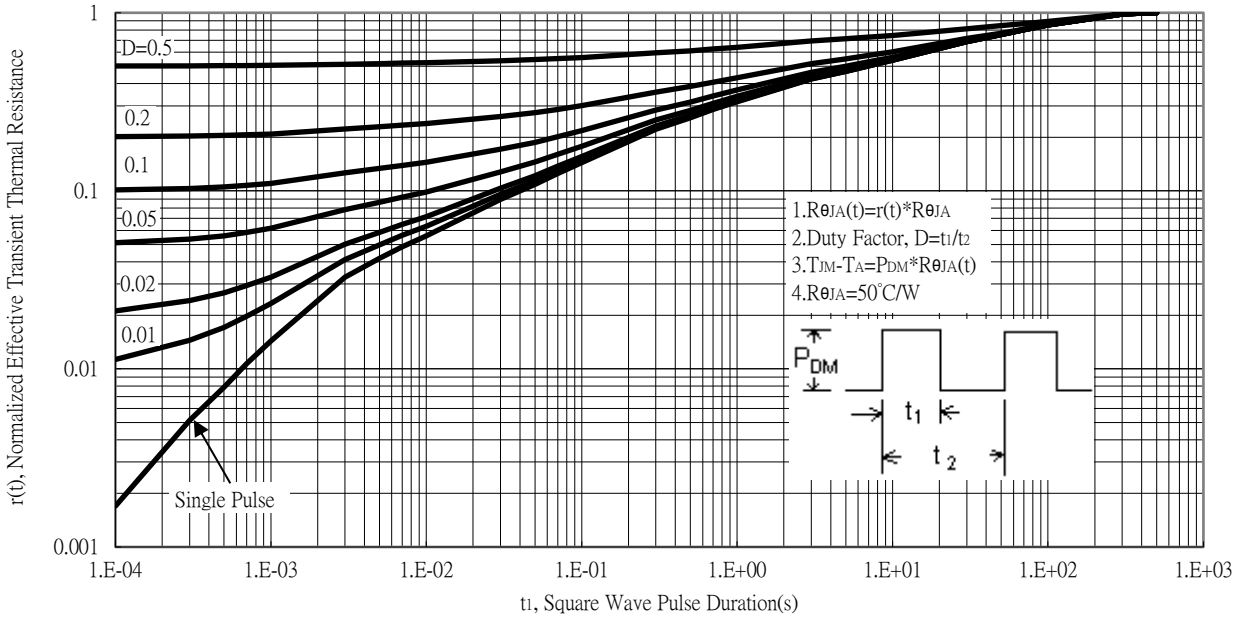
Single Pulse Power Rating, Junction to Ambient



Maximum Drain Current vs Case Temperature

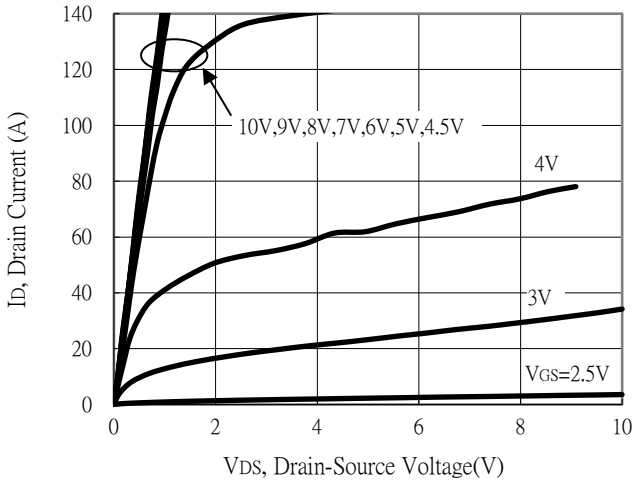


Transient Thermal Response Curves

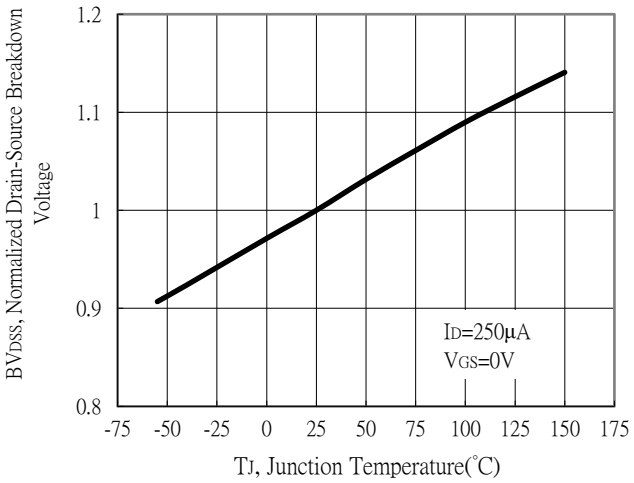


Typical Characteristics : TR2(N-channel)

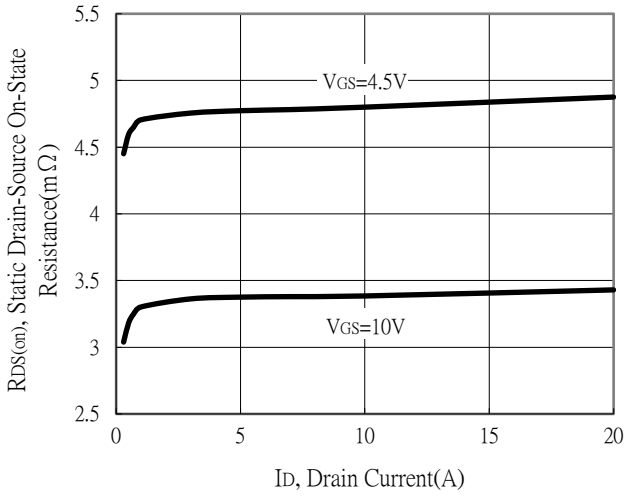
Typical Output Characteristics



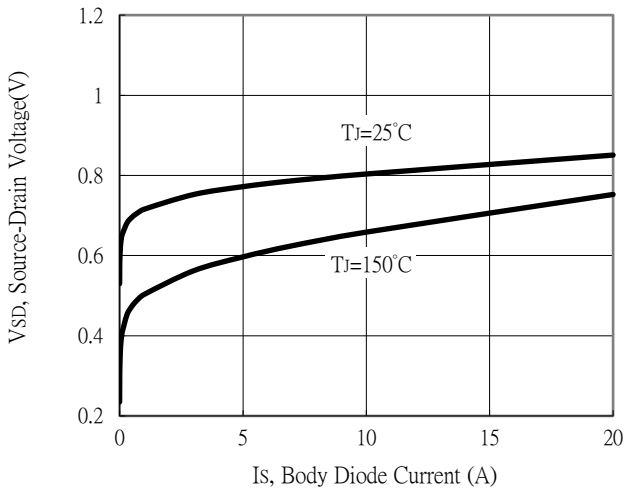
Breakdown Voltage vs Ambient Temperature



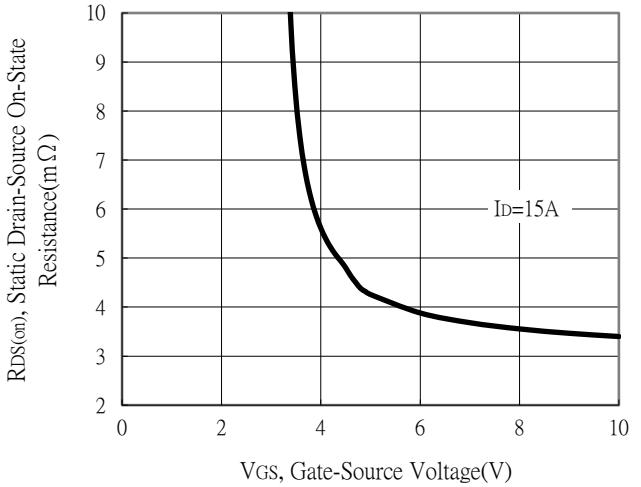
Static Drain-Source On-State resistance vs Drain Current



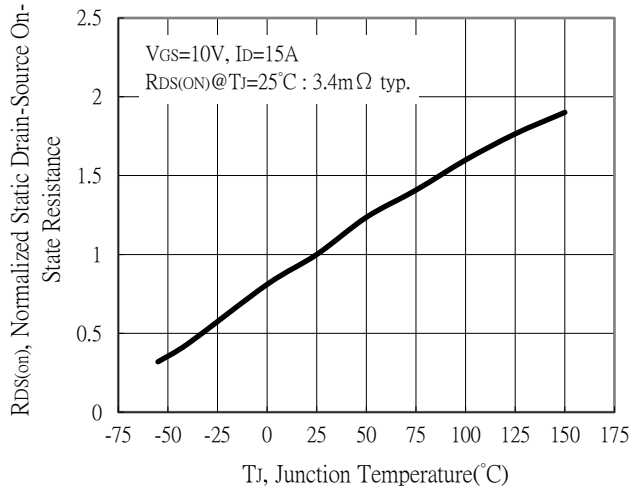
Body Diode Current vs Source-Drain Voltage



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

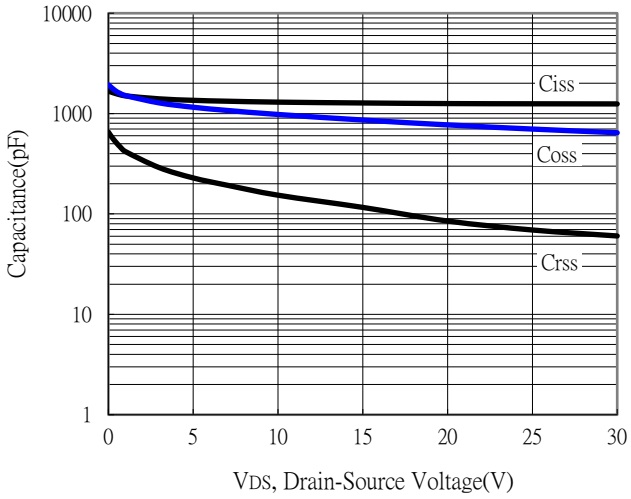


Drain-Source On-State Resistance vs Junction Temperature

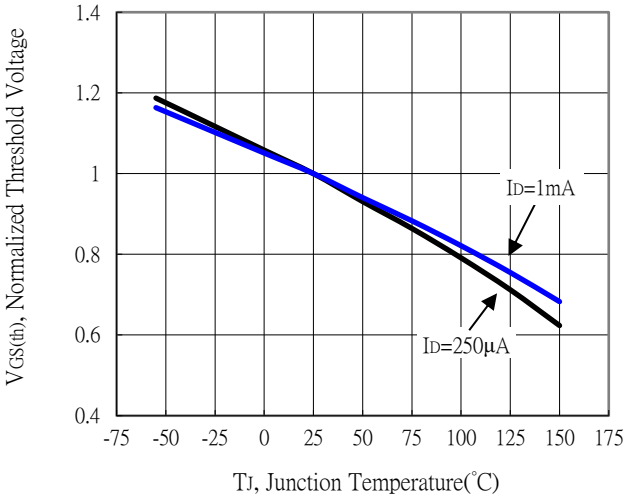


Typical Characteristics (Cont.) : TR2(N-channel)

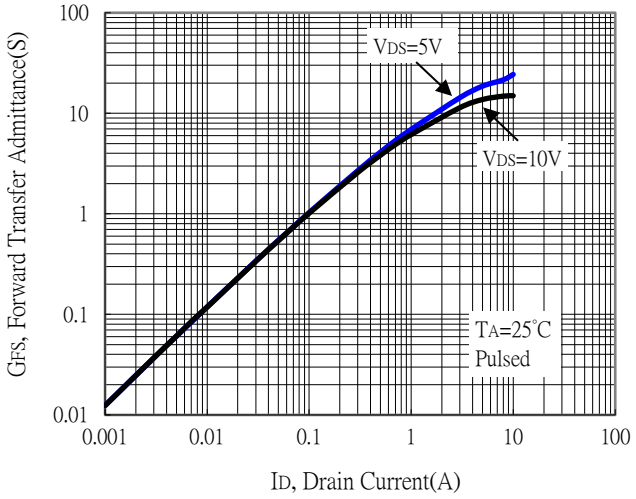
Capacitance vs Drain-to-Source Voltage



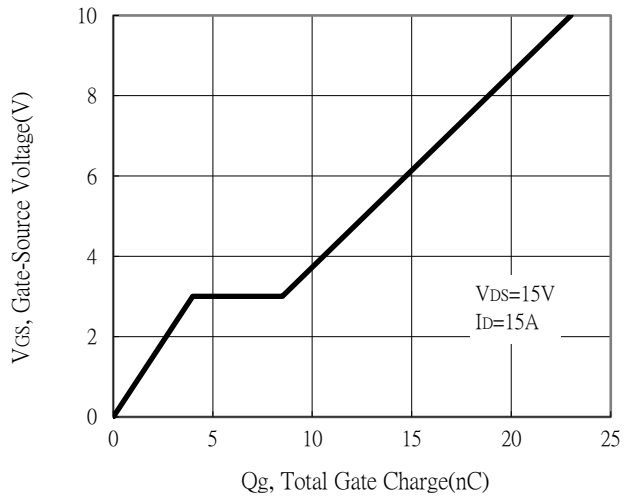
Threshold Voltage vs Junction Temperature



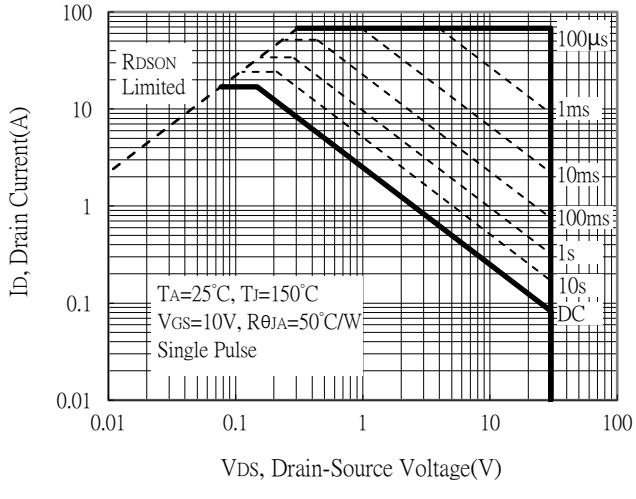
Forward Transfer Admittance vs Drain Current



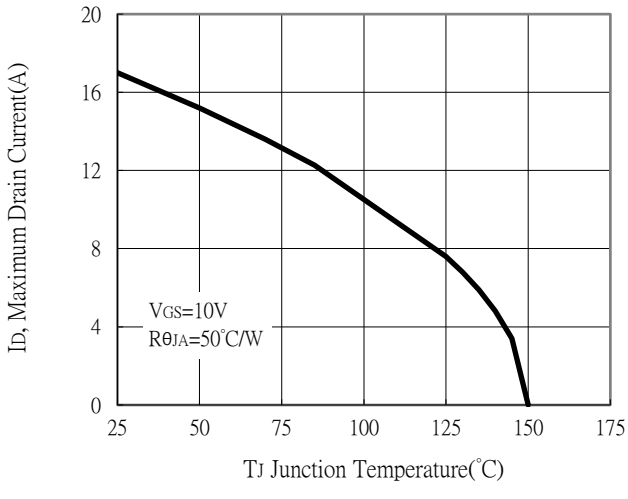
Gate Charge Characteristics



Maximum Safe Operating Area

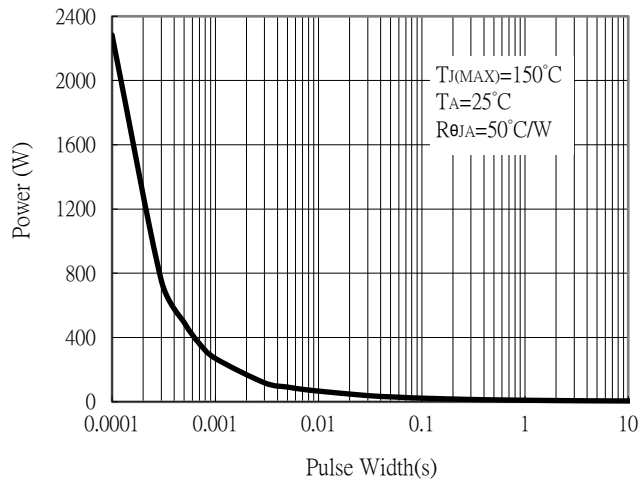


Maximum Drain Current vs Junction Temperature

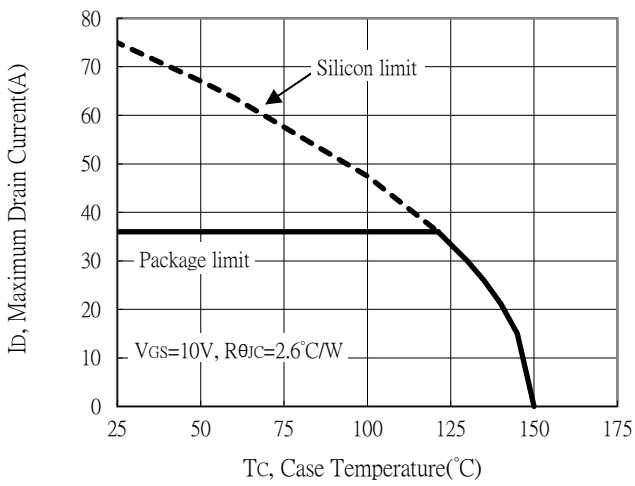


Typical Characteristics (Cont.) : TR2(N-channel)

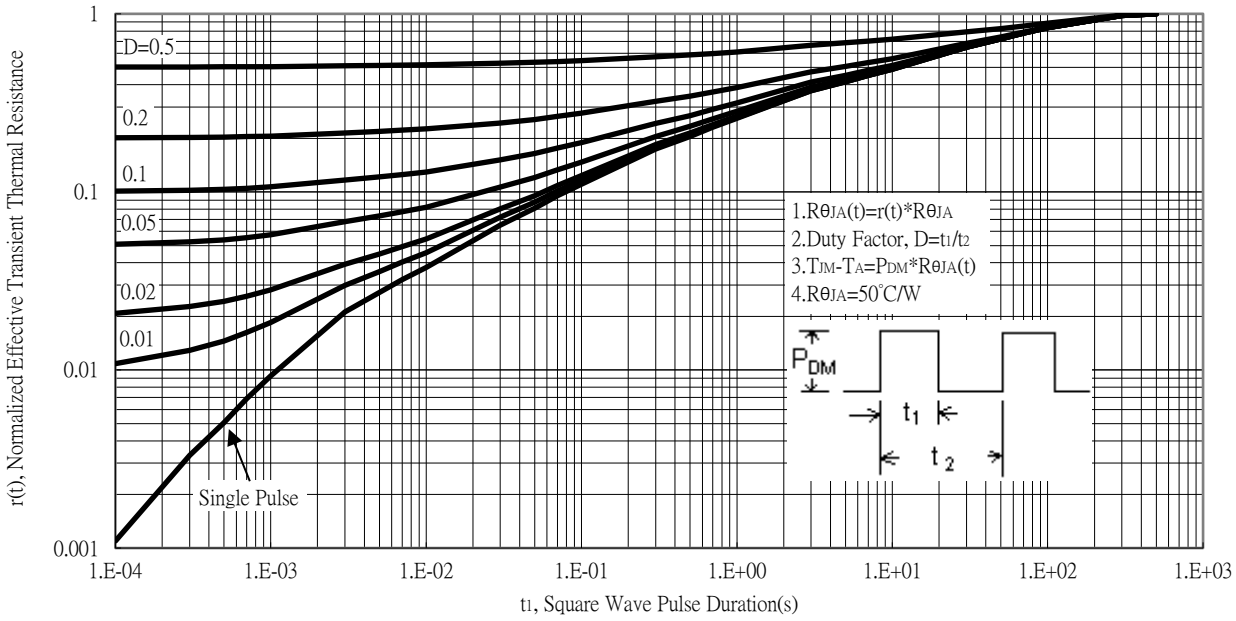
Single Pulse Power Rating, Junction to Ambient



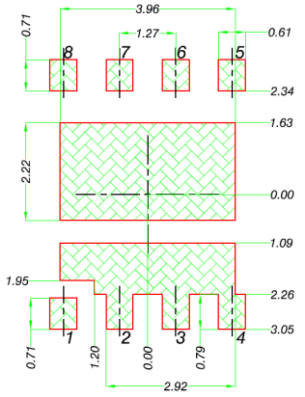
Maximum Drain Current vs Case Temperature



Transient Thermal Response Curves

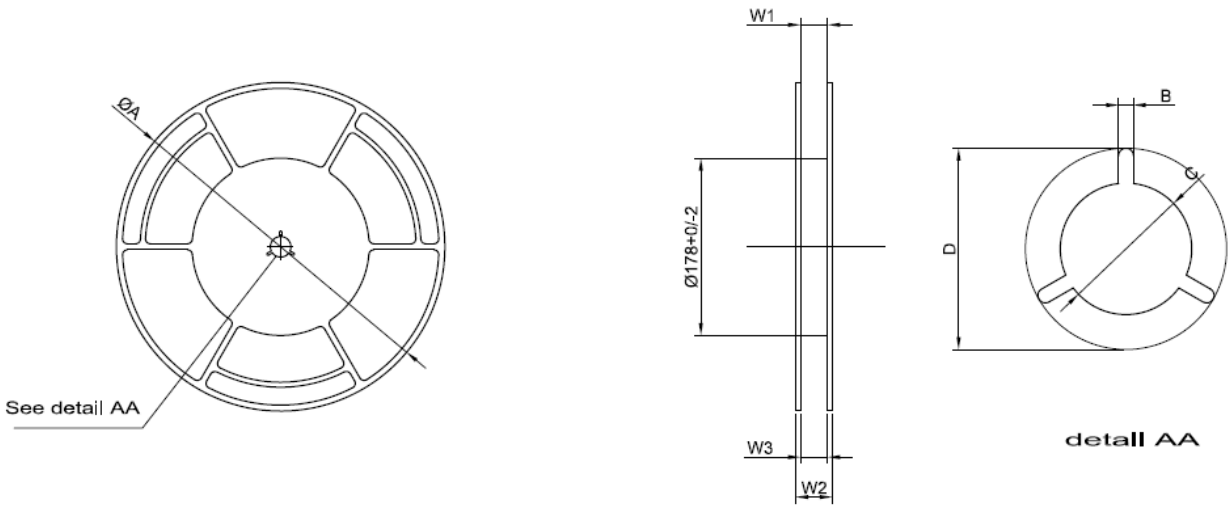


Recommended Soldering Footprint



Unit：mm

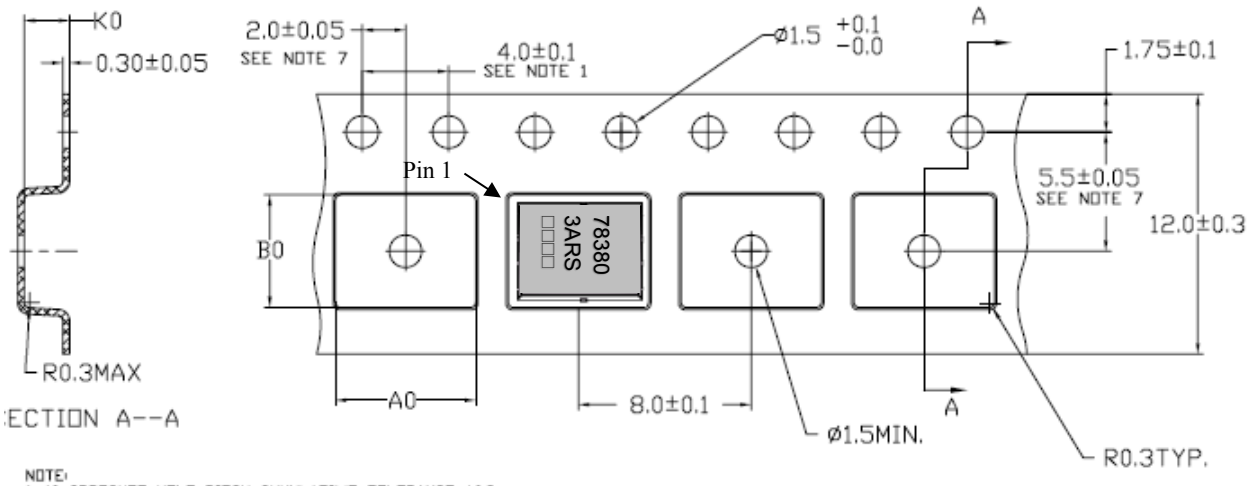
Reel Dimension



TAPE SIZE	A	B	C	D	W1	W2	W3
12mm	330±2.0	2.9±0.5	13.0+0.5/-0	23±1.0	12.4 +2/-0	18.4±0.5	12~15

Unit：mm

Carrier Tape Dimension



NOTE:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER NOT TO EXCEED 1mm IN 100mm, NONCUMULATIVE OVER 250mm.
3. MATERIAL: BLACK STATIC DISSIPATIVE PS.(POLYSTYRENE)
4. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED)
5. A0 AND B0 MEASURED ON A PLANE 0.3mm 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.

Direction of unreeling

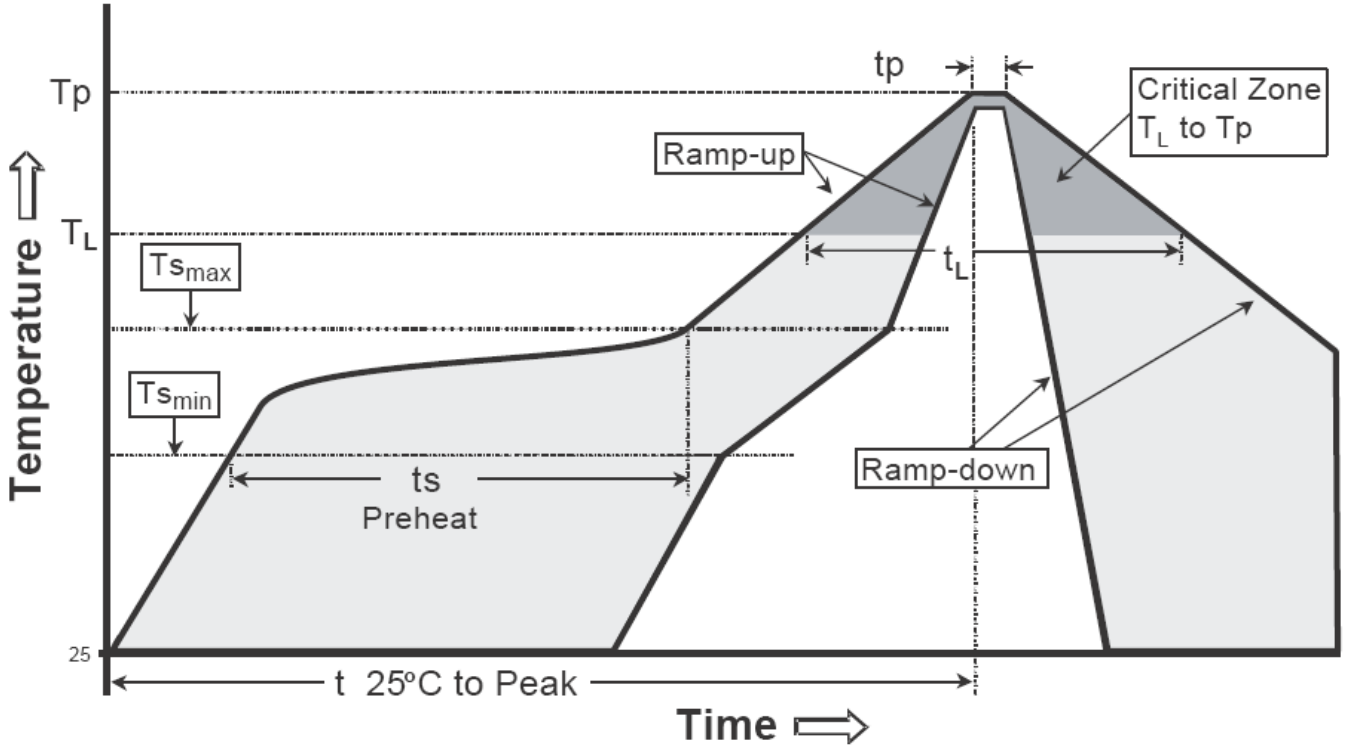
A0=6.5±0.1
B0=5.3±0.1
K0=1.4±0.1

Unit：mm

Recommended wave soldering condition

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

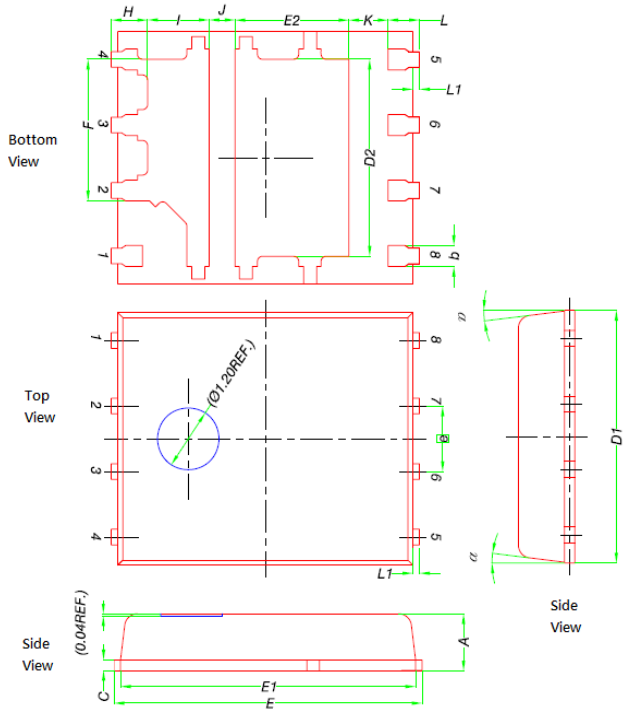
Recommended temperature profile for IR reflow



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.

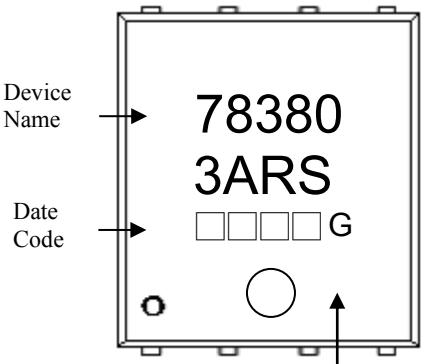
Note : All temperatures refer to topside of the package, measured on the package body surface.

DFN5x6 Dimension



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 , 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.

Marking:



8-Lead DFN5×6 Plastic Package
CYS Package Code : H8

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

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.043	F	2.55	2.90	0.100	0.114
b	0.33	0.51	0.013	0.020	H	0.61	0.81	0.024	0.032
C	0.20	0.30	0.008	0.012	I	1.10	1.30	0.043	0.051
D1	4.80	5.00	0.189	0.197	J	0.40	0.60	0.016	0.024
D2	3.61	3.96	0.142	0.156	K	0.50	-	0.020	-
E	5.90	6.10	0.232	0.240	L	0.51	0.71	0.020	0.028
E1	5.70	5.80	0.224	0.228	L1	0.06	0.20	0.002	0.008
E2	2.02	2.42	0.080	0.095	α	0°	12°	0°	12°
e	1.27 BSC		0.050 BSC						

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.