N- AND P-Channel Enhancement Mode MOSFET

MTC7540DH8

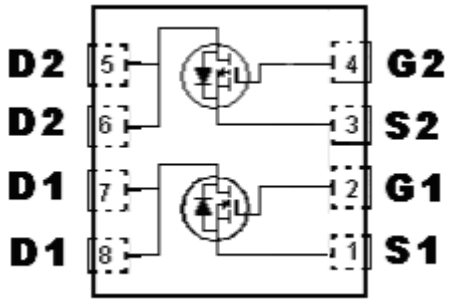
	N-CH	P-CH
BV_{DSS}	20V	-20V
I_D@V_{GS}=4.5V(-4.5V), T_A=25°C	12A	-8.9A
I_D@V_{GS}=4.5V(-4.5V), T_A=70°C	9.6A	-7.1A
I_D@V_{GS}=4.5V(-4.5V), T_C=25°C	28.7A	-21.6A
I_D@V_{GS}=4.5V(-4.5V), T_C=100°C	18.1A	-13.7A
$R_{DSON(typ)}$@V_{GS}=4.5V(-4.5V)	10.5mΩ	20.2mΩ
$R_{DSON(typ)}$@V_{GS}=2.5V(-2.5V)	13.1mΩ	26.4mΩ

Features

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

Equivalent Circuit

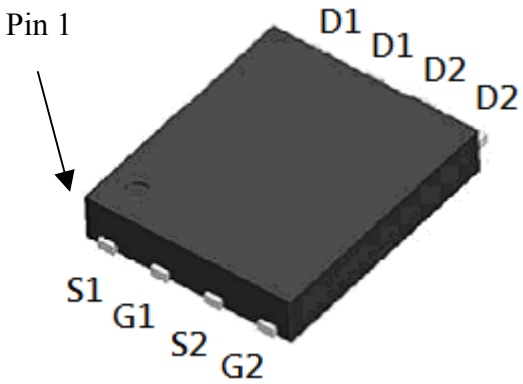
MTC7540DH8



G：Gate S：Source D：Drain

Outline

DFN5×6



Ordering Information

Device	Package	Shipping
MTC7540DH8-0-T6-G	DFN 5 ×6 (Pb-free lead plating & 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 : 2500 pcs / tape & reel, 13” 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		
			10s	steady	10s	steady	
Drain-Source Breakdown Voltage		BV_{DSS}	20		-20		V
Gate-Source Voltage		V_{GS}	±12		±12		
Continuous Drain Current	T_A=25 °C, V_{GS}=4.5V (-4.5V)	I_{DSM}	12	7.7	-8.9	-5.7	A
	T_A=70 °C, V_{GS}=4.5V (-4.5V)		9.6	6.2	-7.1	-4.6	
	T_C=25 °C, V_{GS}=4.5V (-4.5V)	I_D	28.7		-21.6		
	T_C=100 °C, V_{GS}=4.5V (-4.5V)		18.1		-13.7		
Pulsed Drain Current (Note 1 & 2)		I_{DM}	30		-30		
Power Dissipation	T_A=25 °C steady state	P_{DSM}	1.4 (Note 3)				W
	T_A=70 °C steady state		0.8 (Note 3)				
	T_C=25 °C	P_D	23				
	T_C=100 °C		9.2				
Operating Junction and Storage Temperature Range		Tj; Tstg	-55~+150				°C

Thermal Data

Parameter		Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max		$R_{\theta JC}$	5.5	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 3)	t≤10s	$R_{\theta JA}$	35	
	Steady state		85	

Note : 1. Pulse width limited by maximum junction temperature
2. Duty cycle≤1%
3. Surface mounted on 1 in² copper pad of FR-4 board; 125°C/W when mounted on minimum copper pad.

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	20	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.5	-	1.2		V_{DS}=V_{GS}, I_D=250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=20V, V_{GS}=0V
	-	-	5		V_{DS}=20V, V_{GS}=0V , Tj=55°C
*$R_{DS(ON)}$	-	10.5	14	mΩ	I_D=11.8A, V_{GS}=4.5V
	-	13.1	17		I_D=9.8A, V_{GS}=2.5V
*G_{FS}	-	20	-	S	V_{DS}=5V, I_D=11.8A
Dynamic					
Ciss	-	782	-	pF	V_{DS}=10V, V_{GS}=0V, f=1MHz
Coss	-	106	-		
Crss	-	93	-		
*$td_{(ON)}$	-	8.2	-	ns	V_{DS}=6V, I_D=1A, V_{GS}=4.5V, R_G=6Ω
*tr	-	21.2	-		
*$td_{(OFF)}$	-	49.8	-		
*tf	-	11.4	-		

*Qg	-	12.2	-	nC	V_{DS}=6V, I_D=11.8A, V_{GS}=4.5V
*Qgs	-	1.3	-		
*Qgd	-	4.6	-		
Body Diode					
*I_S	-	-	2.9	A	t≤10s
*I_{SM}	-	-	12		
*V_{SD}	-	0.79	1.2	V	V_{GS}=0V, I_S=2.9A
*trr	-	7.6	-	ns	I_F=2.9A dI_F/dt=100A/μs
*Qrr	-	2.8	-	nC	

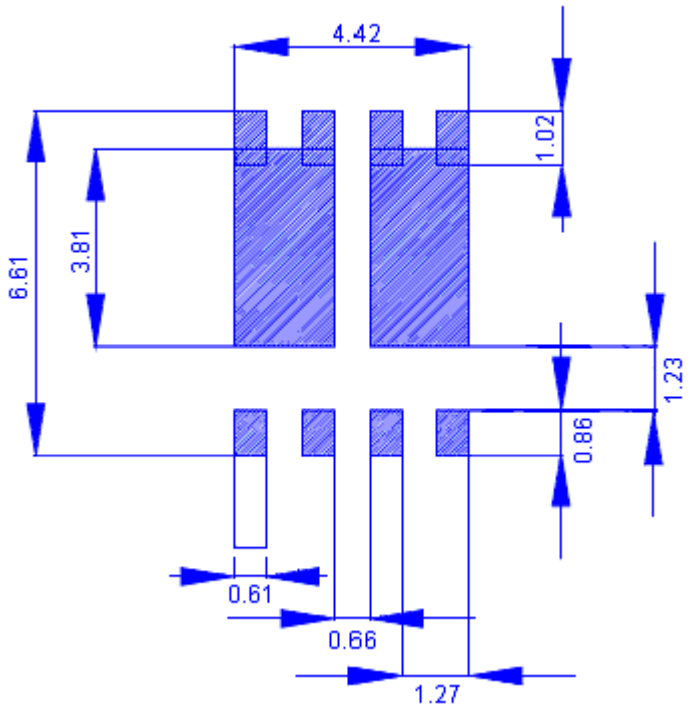
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	-20	-	-	V	V_{GS}=0V, I_D=-250μA
$V_{GS(th)}$	-0.5	-	-1.2		V_{DS}=VGS, I_D=-250μA
I_{GSS}	-	-	±100	nA	V_{GS}=±12V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-20V, V_{GS}=0V
	-	-	-5		V_{DS}=-20V, V_{GS}=0V, Tj=55°C
*$R_{DS(ON)}$	-	20.2	27	mΩ	I_D=-8.9A, V_{GS}=-4.5V
	-	26.4	35		I_D=-6.9A, V_{GS}=-2.5V
*G_{FS}	-	22	-	S	V_{DS}=-5V, I_D=-8.9A
Dynamic					
Ciss	-	1532	-	pF	V_{DS}=-10V, V_{GS}=0V, f=1MHz
Coss	-	157	-		
Crss	-	140	-		
*$td_{(ON)}$	-	13.2	-	ns	V_{DS}=-6V, I_D=-1A, V_{GS}=-4.5V, R_G=6Ω
*tr	-	20.2	-		
*$td_{(OFF)}$	-	133.4	-		
*tf	-	64.4	-		
*Qg	-	25.7	-	nC	V_{DS}=-6V, I_D=-8.9A, V_{GS}=-4.5V
*Qgs	-	4.5	-		
*Qgd	-	9.2	-		
Body Diode					
*I_S	-	-	-2.9	A	t≤10s
*I_{SM}	-	-	-12		
*V_{SD}	-	-0.63	-1.2	V	V_{GS}=0V, I_S=-2.9A
*trr	-	38.6	-	ns	I_F=-2.9A dI_F/dt=100A/μs
*Qrr	-	15.8	-	nC	

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

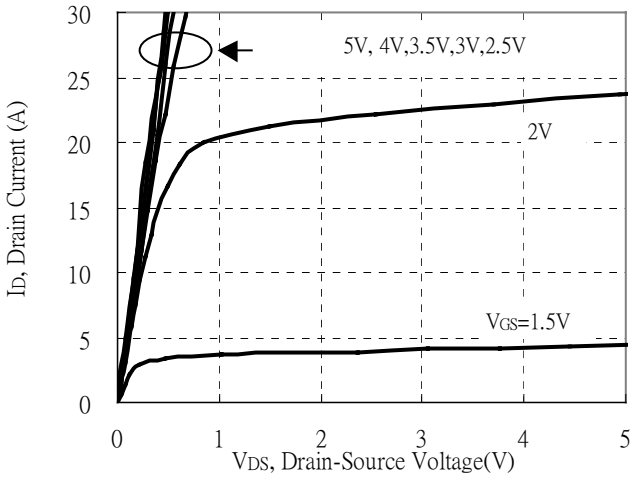
Recommended Soldering Footprint



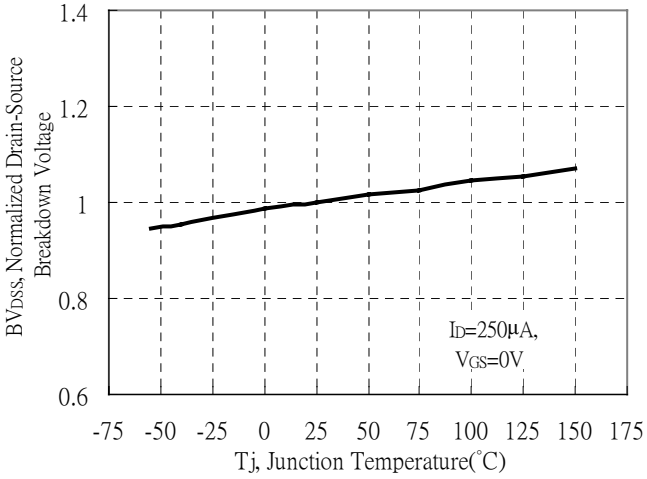
unit : mm

Typical Characteristics : Q1(N-channel)

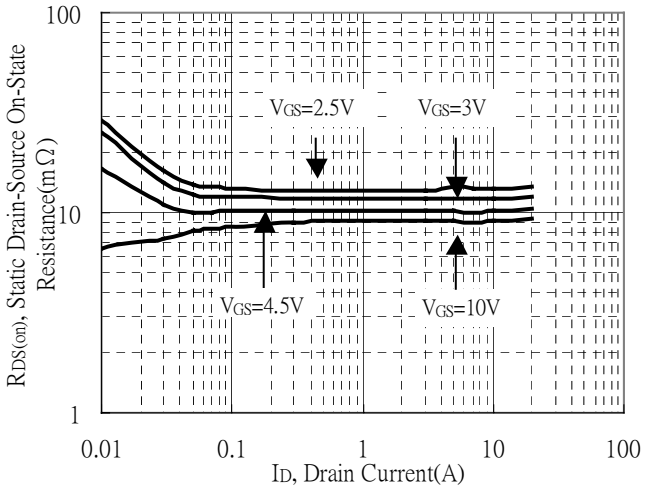
Typical Output Characteristics



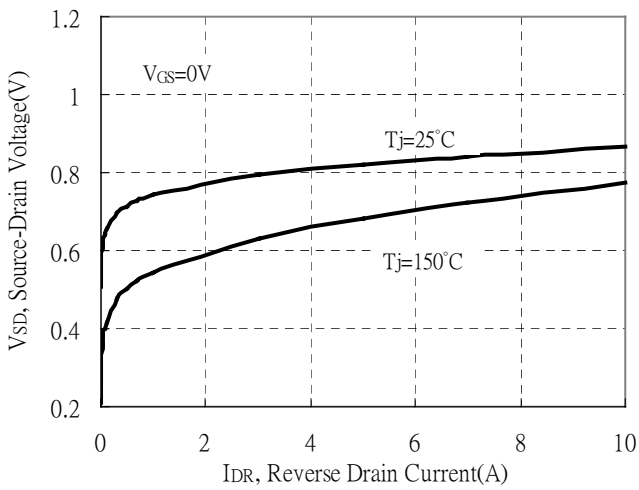
Brekdown Voltage vs Ambient Temperature



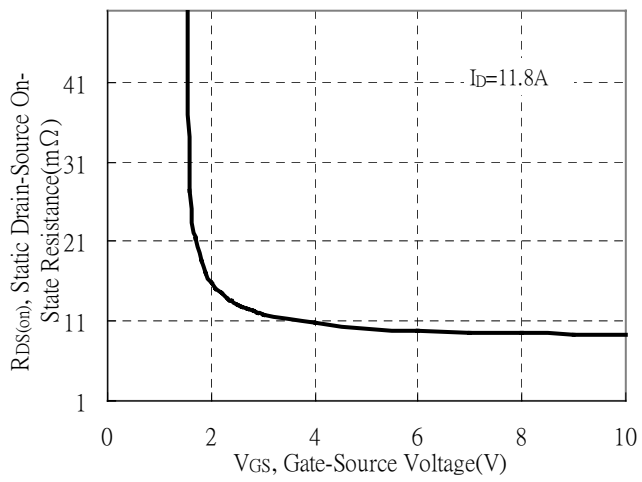
Static Drain-Source On-State resistance vs Drain Current



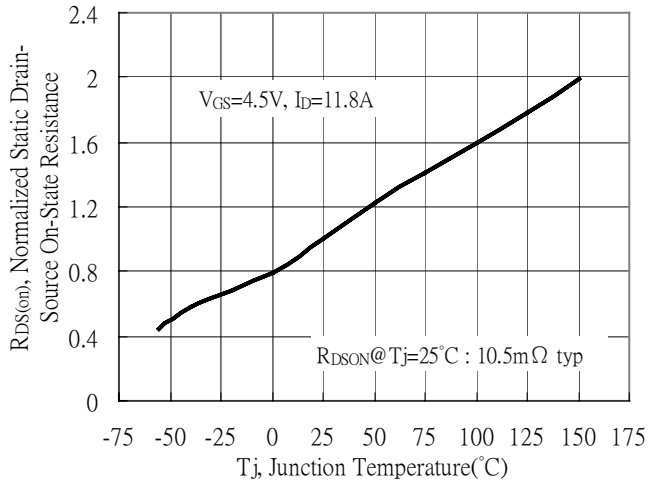
Reverse Drain Current vs Source-Drain Voltage



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

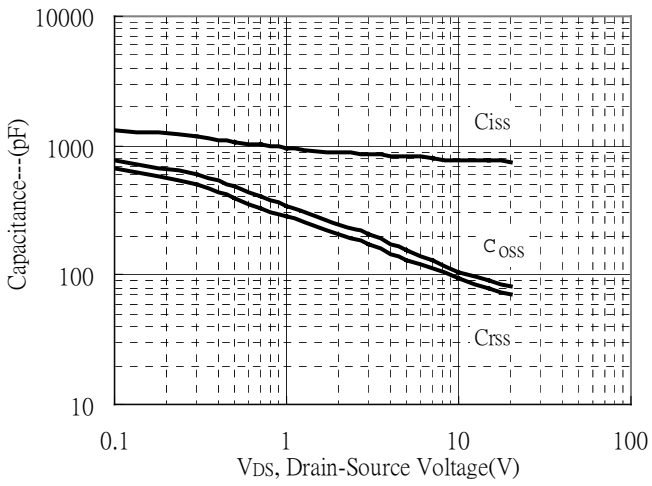


Drain-Source On-State Resistance vs Junction Tempearture

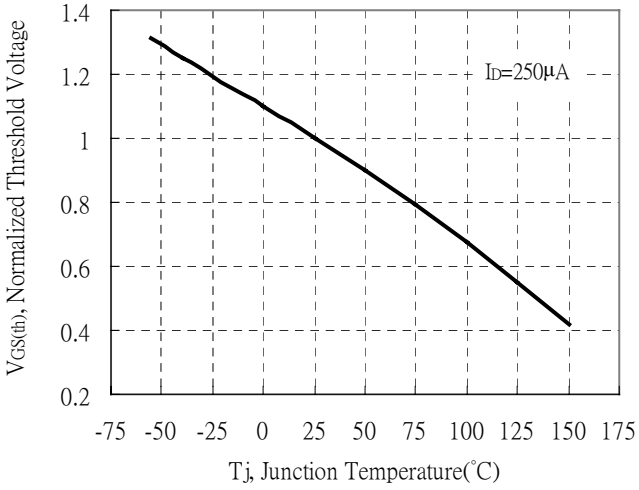


Typical Characteristics(Cont.) : Q1(N-channel)

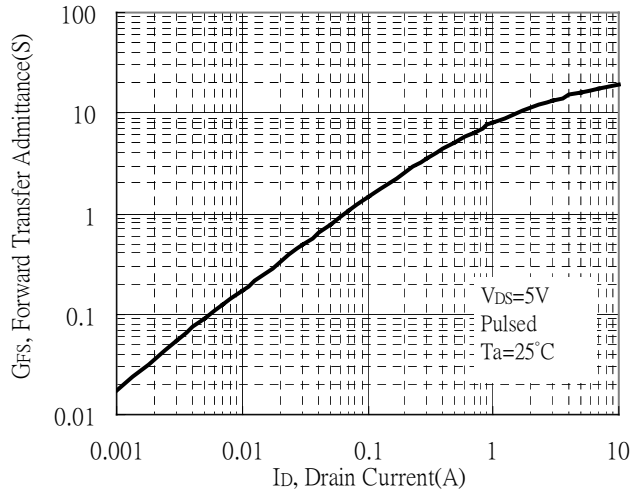
Capacitance vs Drain-to-Source Voltage



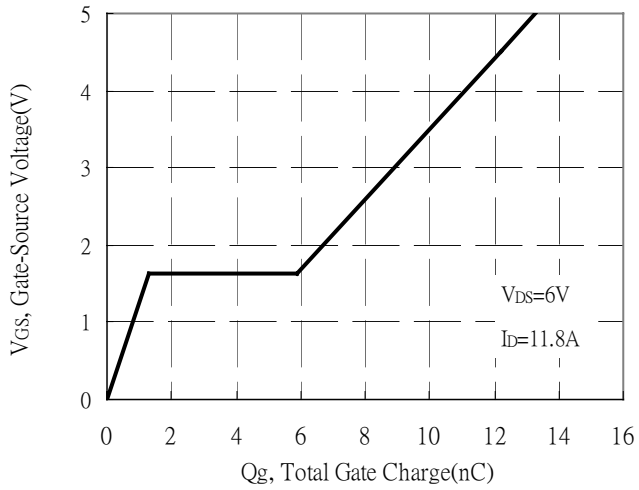
Threshold Voltage vs Junction Tempearture



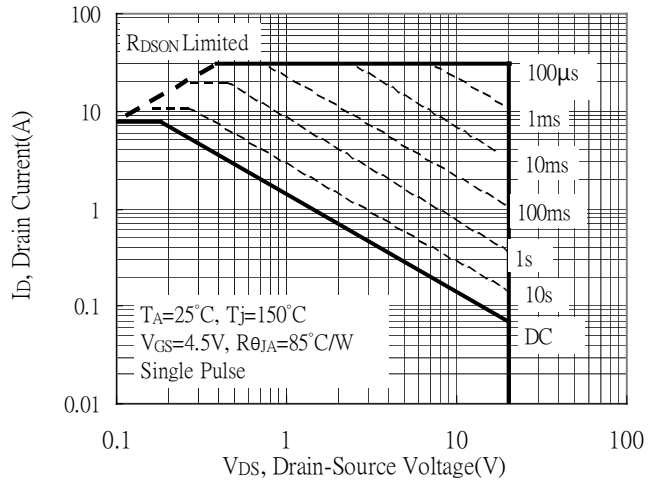
Forward Transfer Admittance vs Drain Current



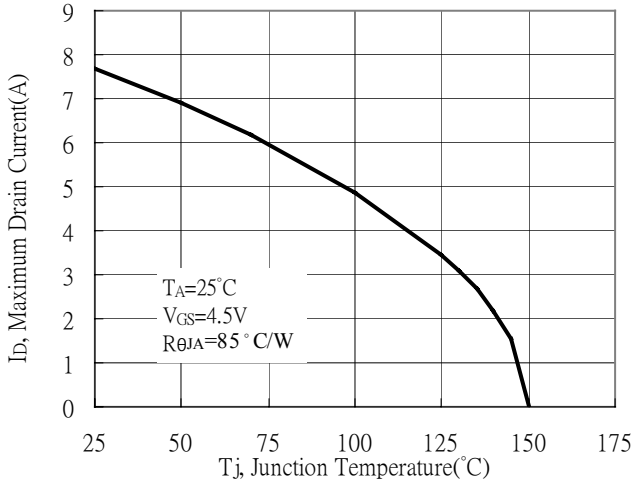
Gate Charge Characteristics



Maximum Safe Operating Area

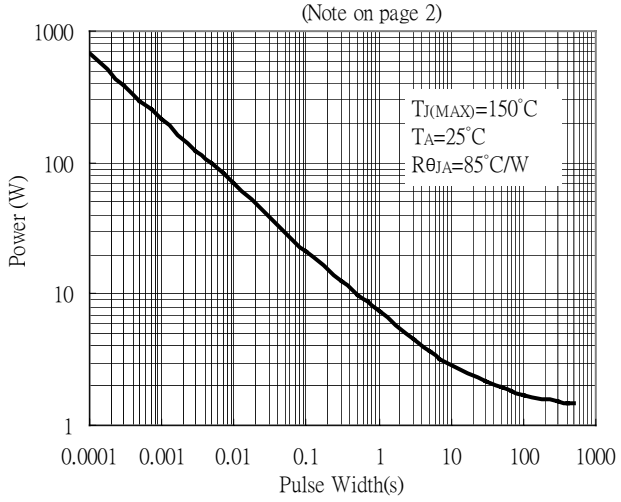


Maximum Drain Current vs Junction Temperature

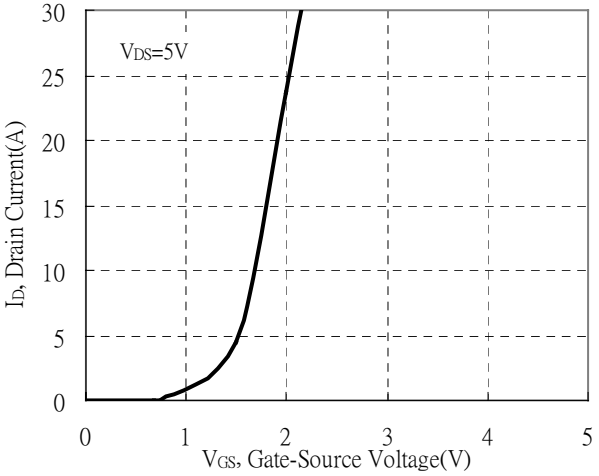


Typical Characteristics(Cont.) : Q1(N-channel)

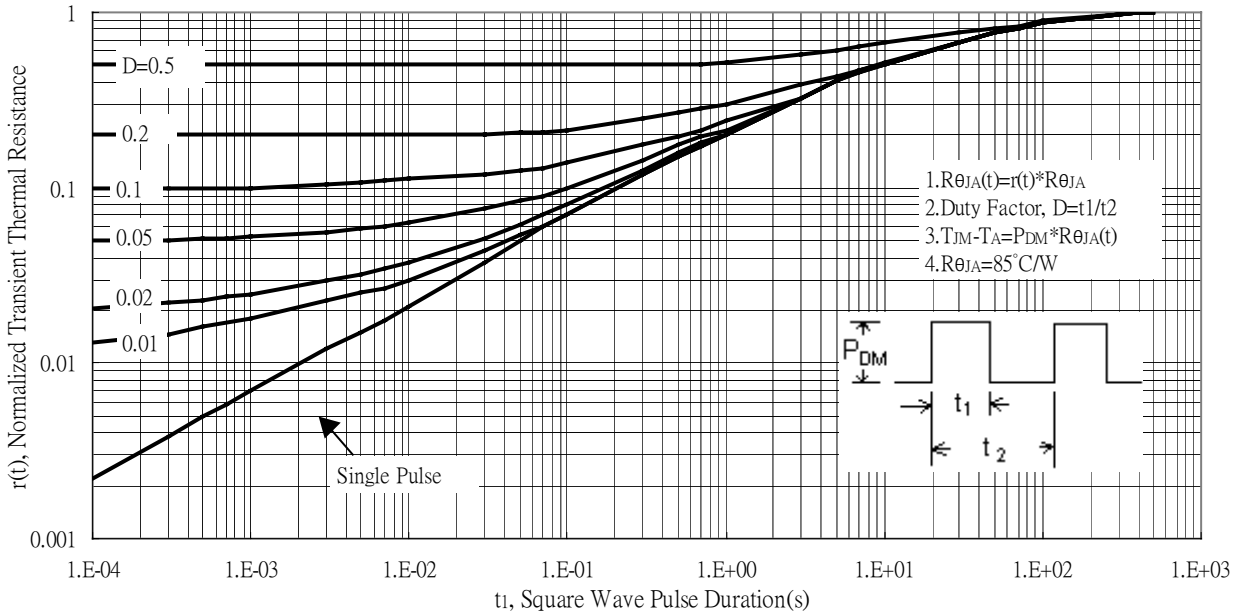
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



Typical Transfer Characteristics

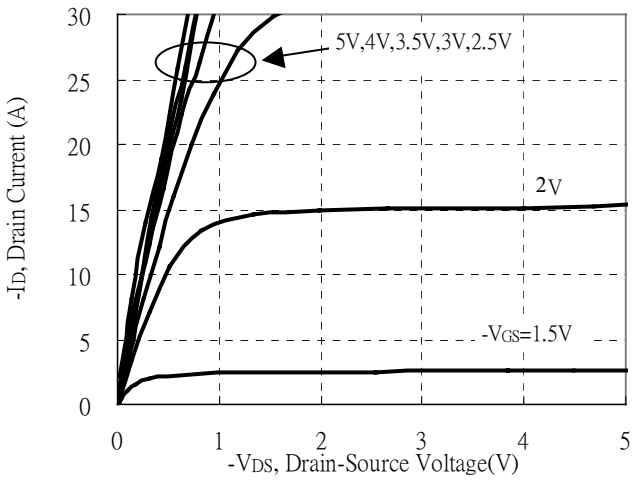


Transient Thermal Response Curves

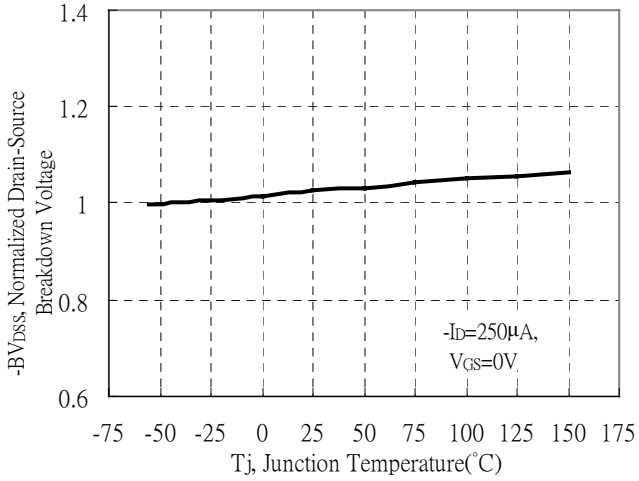


Typical Characteristics : Q2(P-channel)

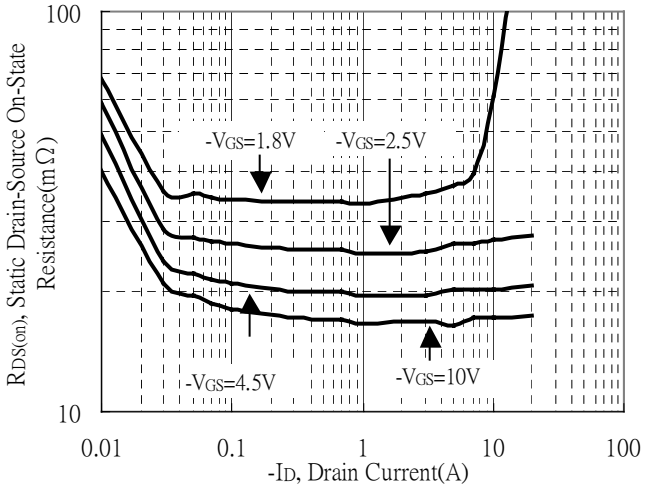
Typical Output Characteristics



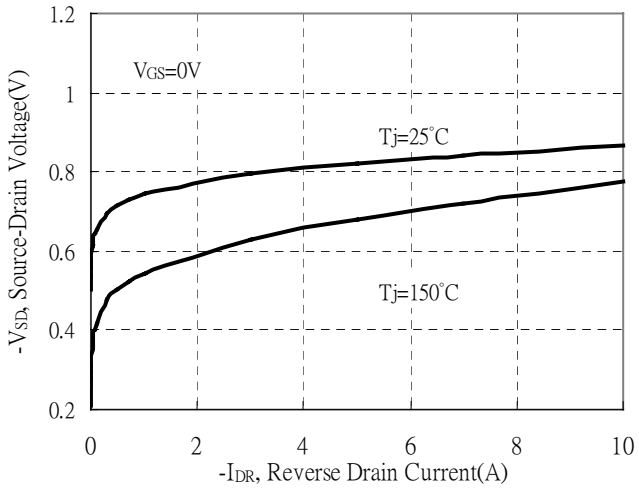
Brekdown Voltage vs Ambient Temperature



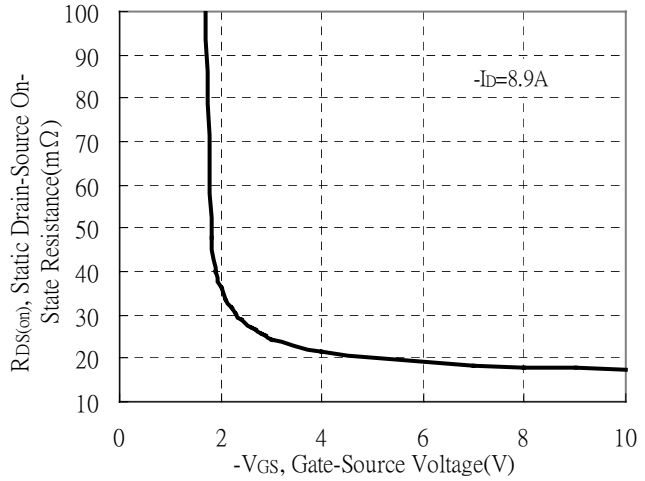
Static Drain-Source On-State resistance vs Drain Current



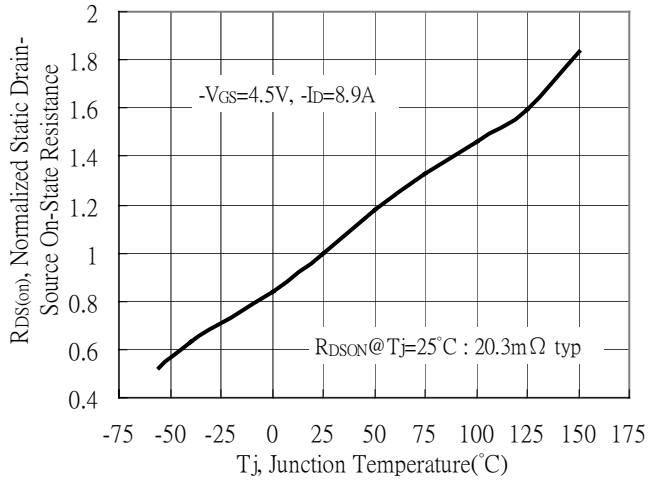
Reverse Drain Current vs Source-Drain Voltage



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

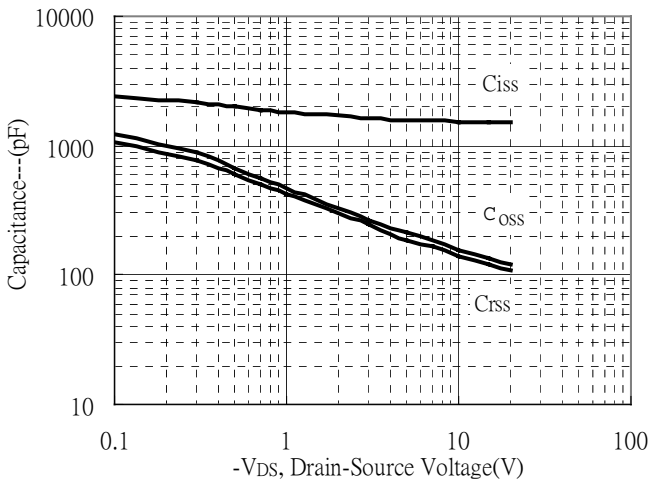


Drain-Source On-State Resistance vs Junction Tempearture

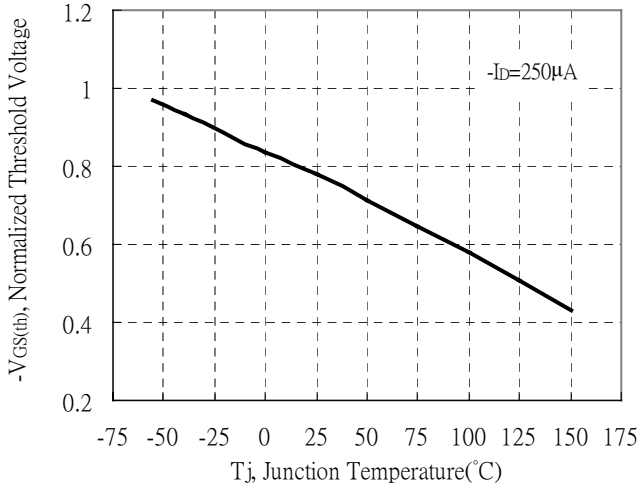


Typical Characteristics(Cont.) : Q2(P-channel)

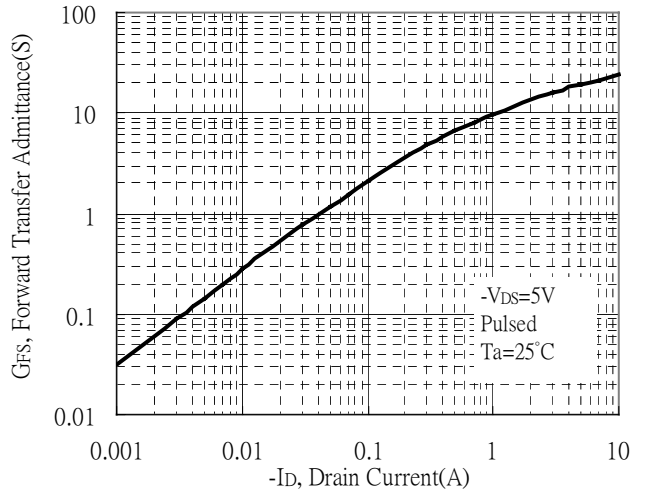
Capacitance vs Drain-to-Source Voltage



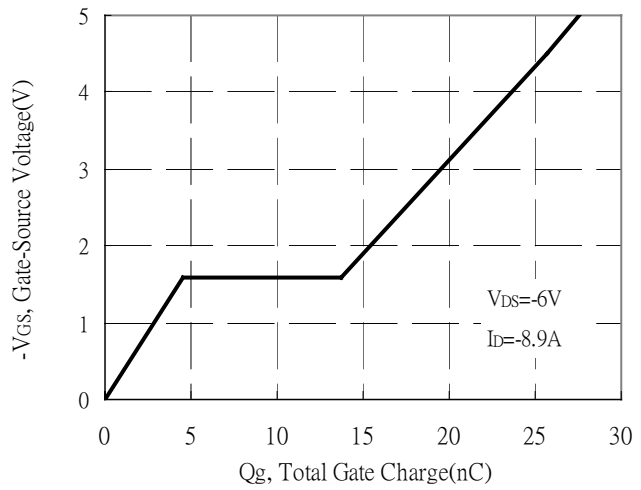
Threshold Voltage vs Junction Tempearture



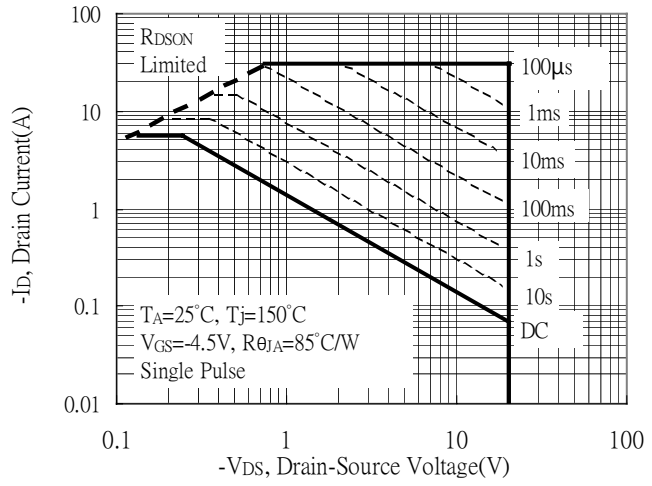
Forward Transfer Admittance vs Drain Current



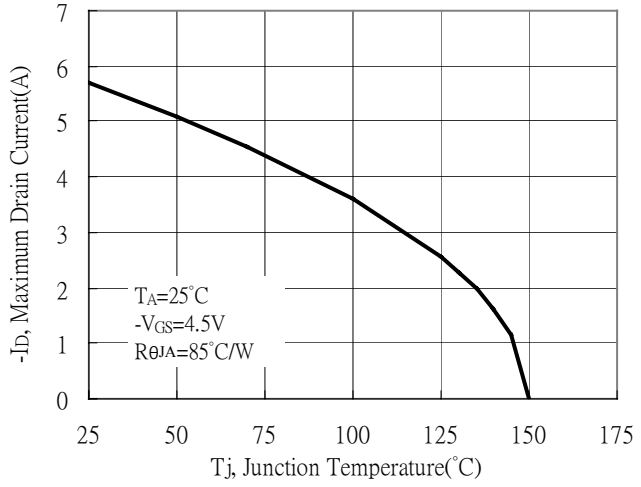
Gate Charge Characteristics



Maximum Safe Operating Area

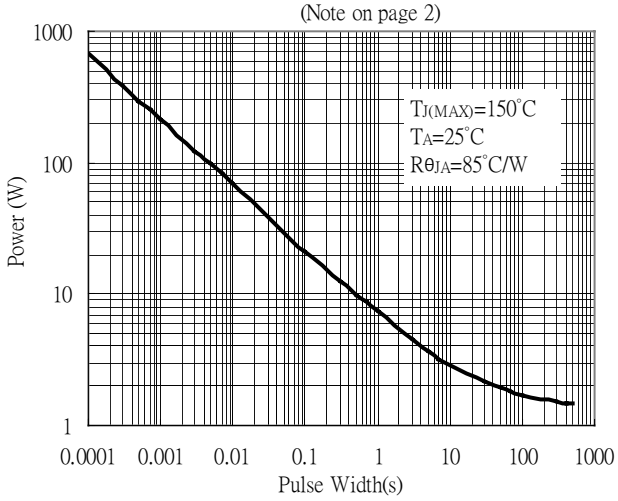


Maximum Drain Current vs Junction Temperature

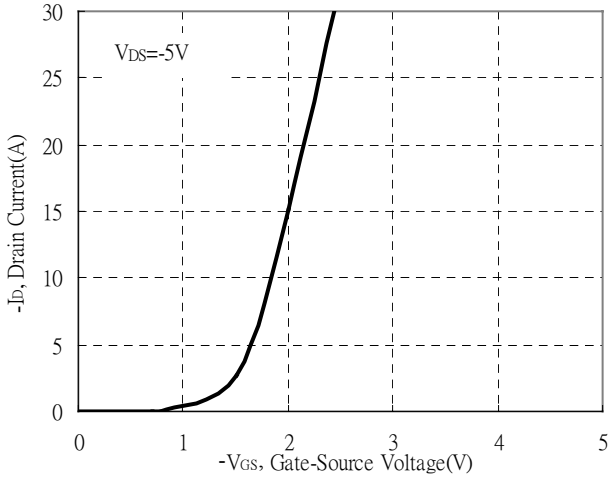


Typical Characteristics(Cont.) : Q2(P-channel)

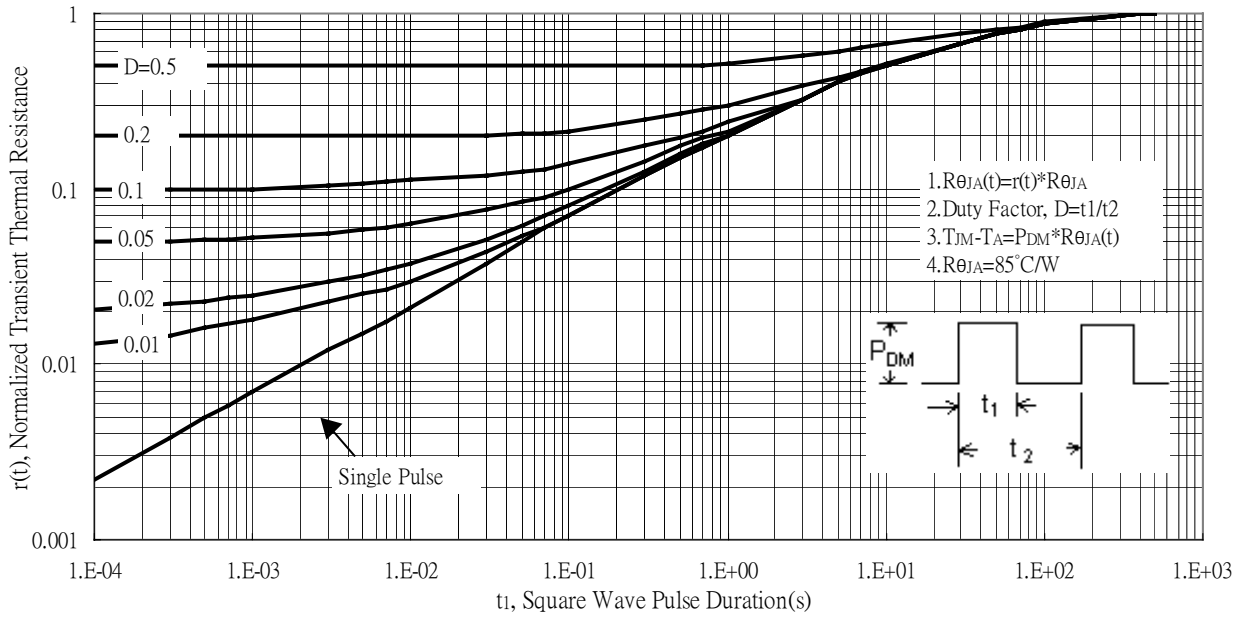
Single Pulse Power Rating, Junction to Ambient
(Note on page 2)



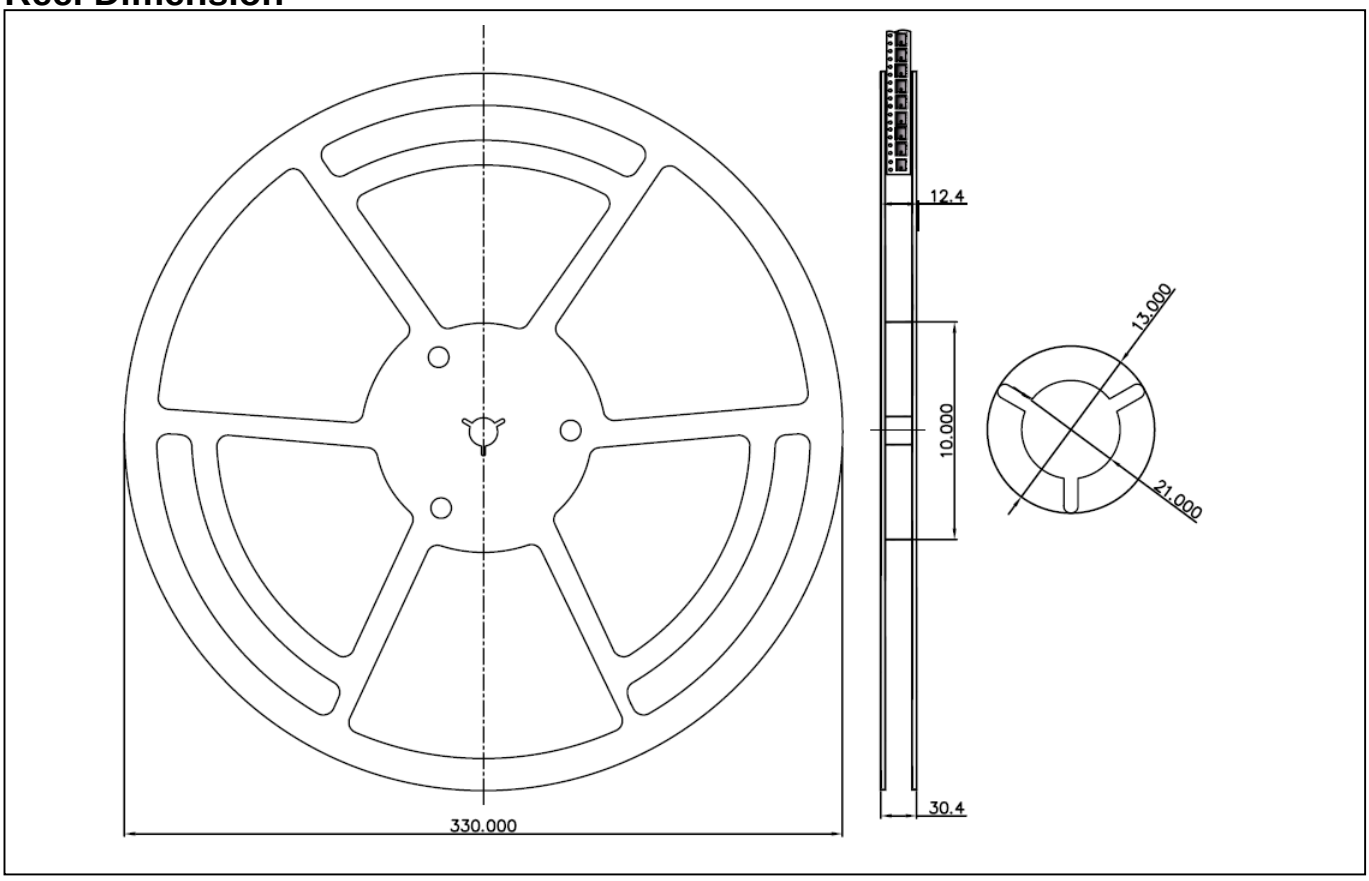
Typical Transfer Characteristics



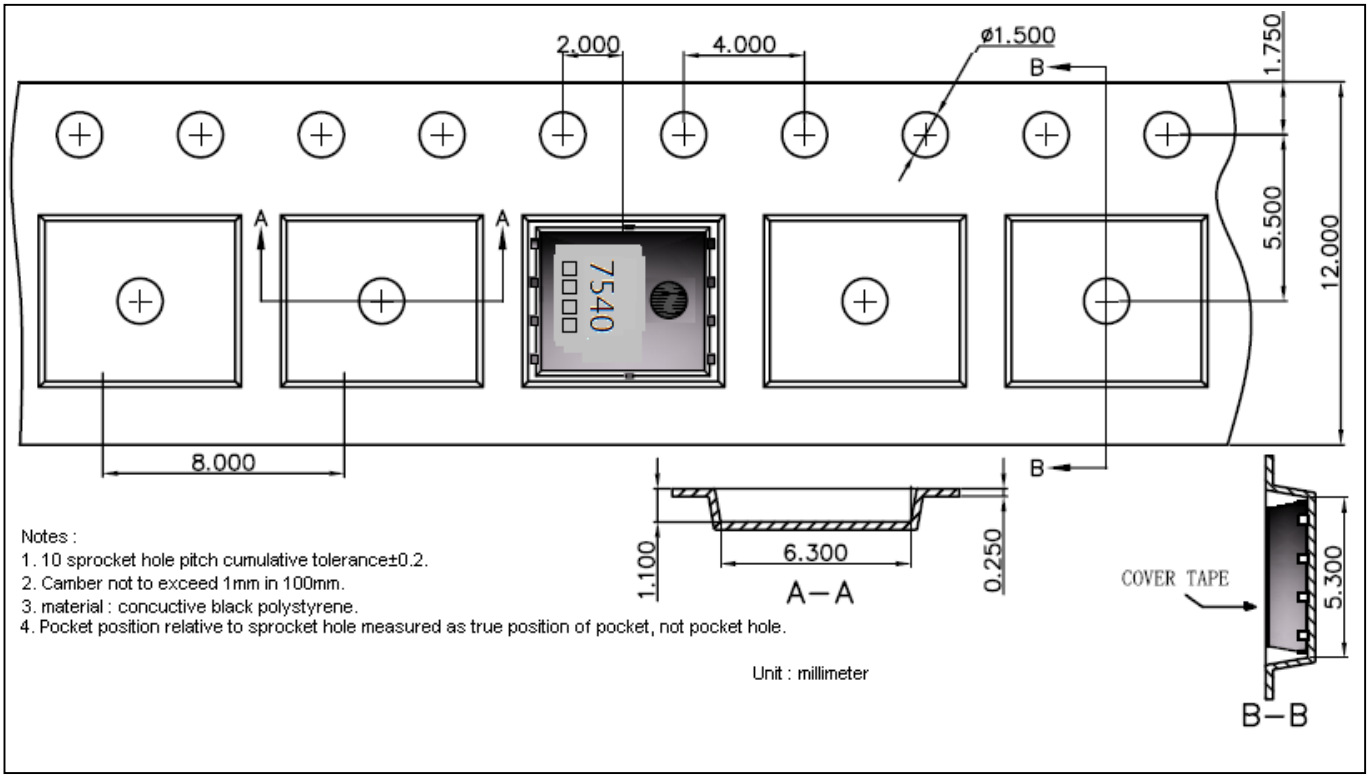
Transient Thermal Response Curves



Reel Dimension



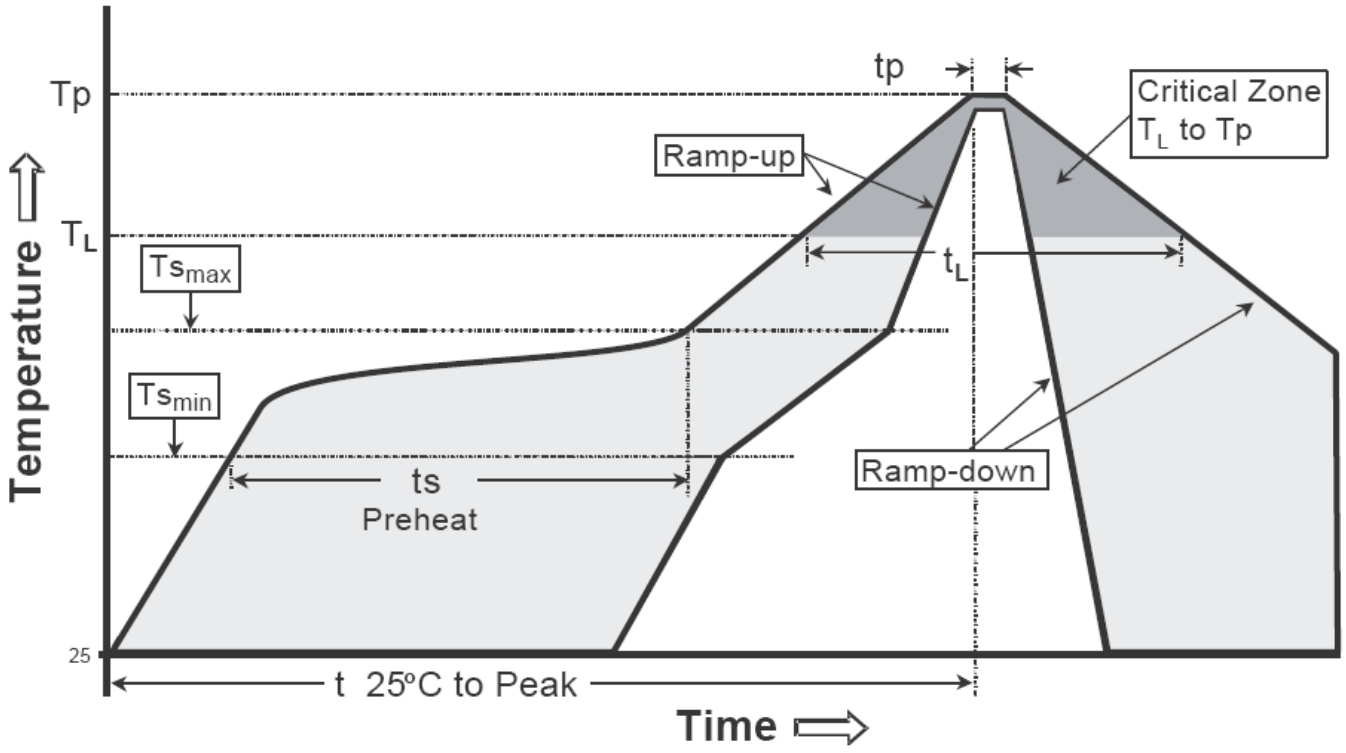
Carrier Tape Dimension



Recommended wave soldering condition

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

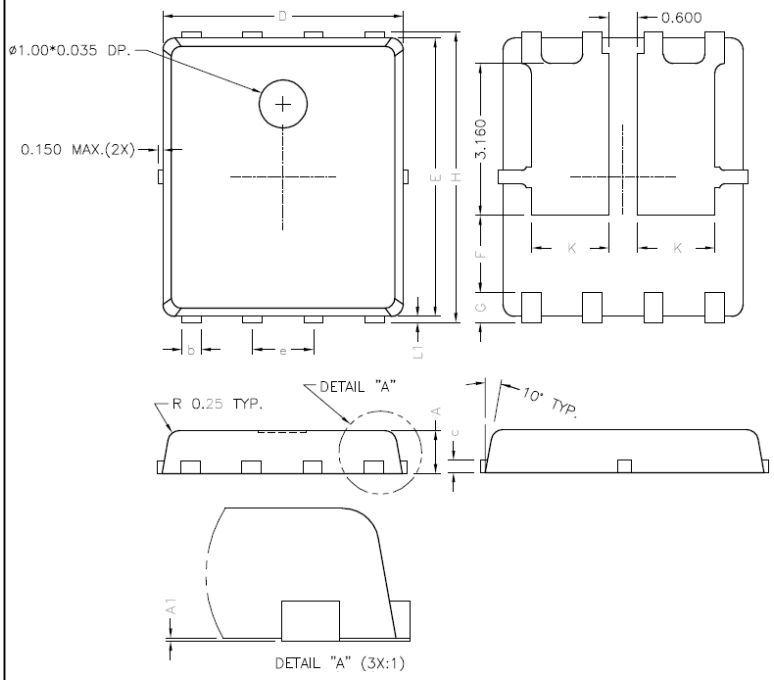
Recommended temperature profile for IR reflow

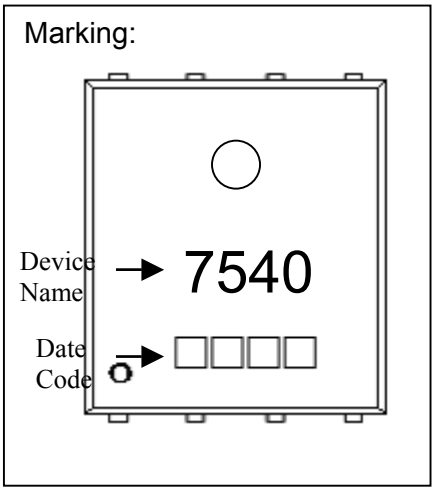


Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time(ts $_{min}$ to ts $_{max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature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

DFN5x6 Dimension





8-Lead DFN5x6 Plastic Package
CYS Package Code : H8

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.80	1.00	0.031	0.039	E	5.70	5.90	0.224	0.232
A1	0.00	0.05	0.000	0.002	e	1.27 BSC		0.050 BSC	
b	0.35	0.49	0.014	0.019	H	5.95	6.20	0.234	0.244
c	0.254 REF		0.010 REF		L1	0.10	0.18	0.004	0.007
D	4.90	5.10	0.193	0.201	G	0.60 REF		0.024 REF	
F	1.60 REF		0.063 REF		K	1.60 REF		0.063 REF	

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.