

N- AND P-Channel Enhancement Mode MOSFET

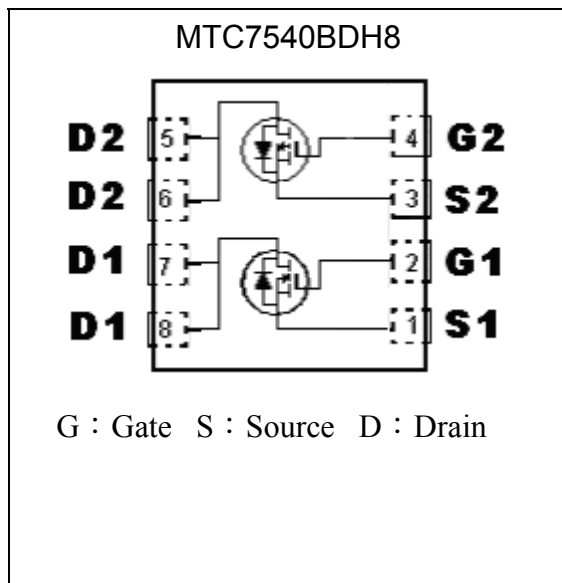
MTC7540BDH8

	N-CH	P-CH
BV_{DSS}	14V	-14V
$I_D@V_{GS}=4.5V(-4.5V), T_A=25^\circ C$	10.6A	-9.5A
$I_D@V_{GS}=4.5V(-4.5V), T_A=70^\circ C$	8.5A	-7.6A
$I_D@V_{GS}=4.5V(-4.5V), T_C=25^\circ C$	25.8A	-23.0A
$I_D@V_{GS}=4.5V(-4.5V), T_C=100^\circ C$	16.3A	-14.6A
$R_{DS(on)(typ)}@V_{GS}=4.5V(-4.5V)$	15.7mΩ	21.3mΩ
$R_{DS(on)(typ)}@V_{GS}=2.5V(-2.5V)$	24.4mΩ	32.2mΩ

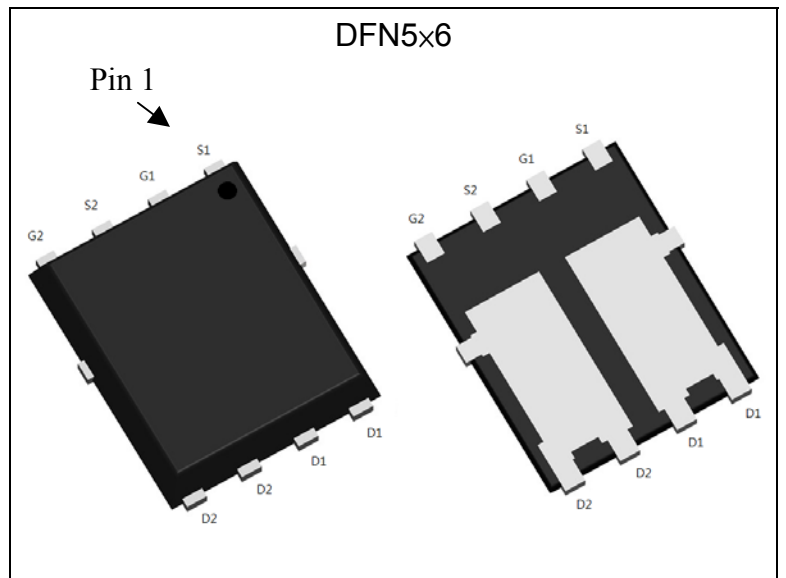
Features

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

Equivalent Circuit

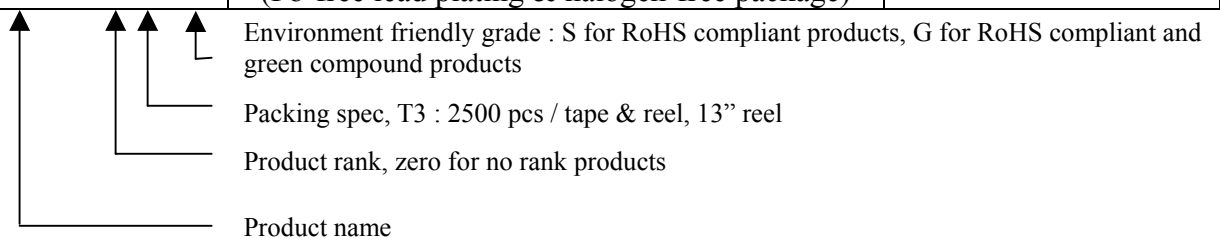


Outline



Ordering Information

Device	Package	Shipping
MTC7540BDH8-0-T6-G	DFN 5 x6 (Pb-free lead plating & halogen-free package)	3000 pcs / Tape & Reel





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

Parameter	Symbol	Limits				Unit	
		N-channel		P-channel			
		10s	steady	10s	steady		
Drain-Source Breakdown Voltage	BV _{DSS}	14		-14		V	
Gate-Source Voltage	V _{GS}	±8		±8			
Continuous Drain Current	T _A =25 °C, V _{GS} =4.5V (-4.5V)	I _{DSM}	10.6	6.8	-9.5	-6.1	A
	T _A =70 °C, V _{GS} =4.5V (-4.5V)		8.5	5.4	-7.6	-4.9	
	T _C =25 °C, V _{GS} =4.5V (-4.5V)	I _D	25.8		-23		
	T _C =100 °C, V _{GS} =4.5V (-4.5V)		16.3		-14.6		
Pulsed Drain Current (Note 1 & 2)	I _{DM}	27		-24			
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	21				
	T _C =100 °C		8.4				
Operating Junction and Storage Temperature Range	T _j ; T _{stg}	-55~+150				°C	

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{θJC}	6	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 3)	t≤10s	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 (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	14	-	-	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} =±8V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =14V, V _{GS} =0V
	-	-	25		V _{DS} =10V, V _{GS} =0V, T _j =55°C
*R _{DS(ON)}	-	15.7	25	mΩ	I _D =11.8A, V _{GS} =4.5V
	-	24.4	37		I _D =9.8A, V _{GS} =2.5V
*G _{FS}	-	10	-	S	V _{DS} =5V, I _D =5A
Dynamic					
C _{iss}	-	390	-	pF	V _{DS} =10V, V _{GS} =0V, f=1MHz
C _{oss}	-	109	-		
C _{rss}	-	95	-		
*t _{d(ON)}	-	6.8	-	ns	V _{DS} =6V, I _D =1A, V _{GS} =4.5V, R _G =6Ω
*t _r	-	21	-		
*t _{d(OFF)}	-	25.8	-		
*t _f	-	11.2	-		



*Qg	-	5	-	nC	V _{DS} =10V, I _D =7.8A, V _{GS} =4.5V
*Qgs	-	0.7	-		
*Qgd	-	1.4	-		
Body Diode					
*I _S	-	-	2.9	A	t≤10s
*I _{SM}	-	-	12		
*V _{SD}	-	0.83	1.2	V	V _{GS} =0V, I _S =2.9A
*t _{rr}	-	10.2	-	ns	I _F =2.9A dI _F /dt=100A/μs
*Q _{rr}	-	1.7	-	nC	

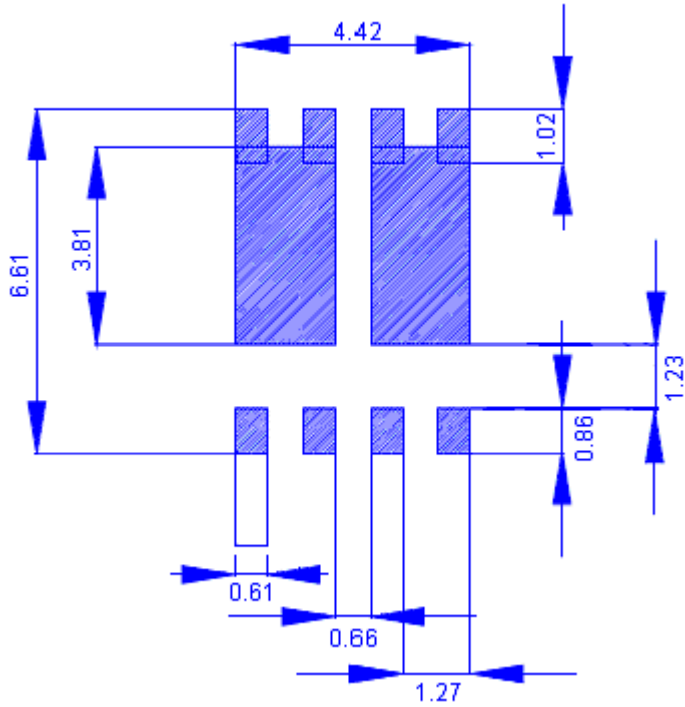
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
B _V D _{SS}	-14	-	-	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} =±8V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-12V, V _{GS} =0V
	-	-	-25		V _{DS} =-10V, V _{GS} =0V, T _j =55°C
*R _{DS(ON)}	-	21.3	28	mΩ	I _D =-8.9A, V _{GS} =-4.5V
	-	32.2	48.5		I _D =-6.9A, V _{GS} =-2.5V
*G _{FS}	-	8.9	-	S	V _{DS} =-5V, I _D =-5A
Dynamic					
C _{iss}	-	1085	-	pF	V _{DS} =-10V, V _{GS} =0V, f=1MHz
C _{oss}	-	224	-		
C _{rss}	-	192	-		
*t _{d(ON)}	-	13.6	-	ns	V _{DS} =-6V, I _D =-1A, V _{GS} =-4.5V, R _G =6Ω
*t _r	-	25.2	-		
*t _{d(OFF)}	-	97	-		
*t _f	-	64.6	-		
*Q _g	-	11.6	-	nC	V _{DS} =-10V, I _D =-8.9A, V _{GS} =-4.5V
*Q _{gs}	-	2.1	-		
*Q _{gd}	-	2.4	-		
Body Diode					
*I _S	-	-	-2.9	A	t≤10s
*I _{SM}	-	-	-12		
*V _{SD}	-	-0.82	-1.2	V	V _{GS} =0V, I _S =-2.9A
*t _{rr}	-	11	-	ns	I _F =-2.9A dI _F /dt=100A/μs
*Q _{rr}	-	3	-	nC	

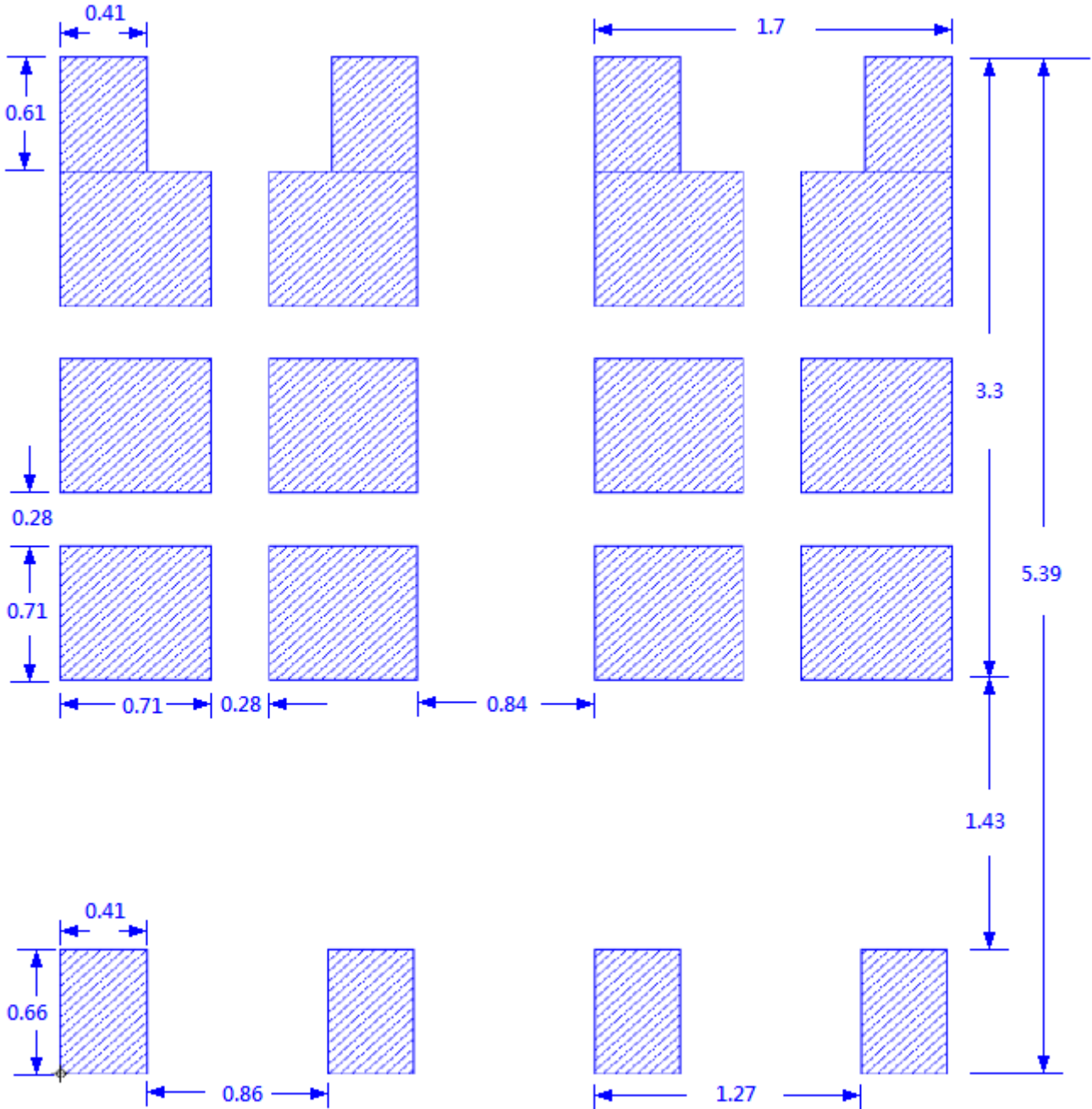
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Recommended Soldering Footprint



unit : mm

Recommended Stencil Design



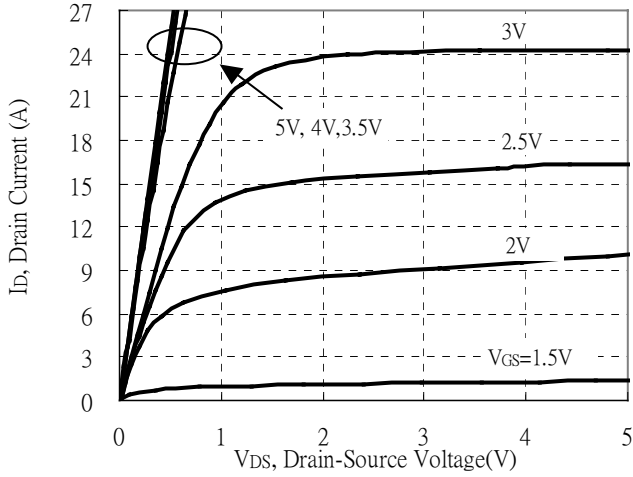
unit : mm

- Note :**
1. Stencil thickness 5 mil (0.127mm)
 2. May need to be adjusted to specific requirements.

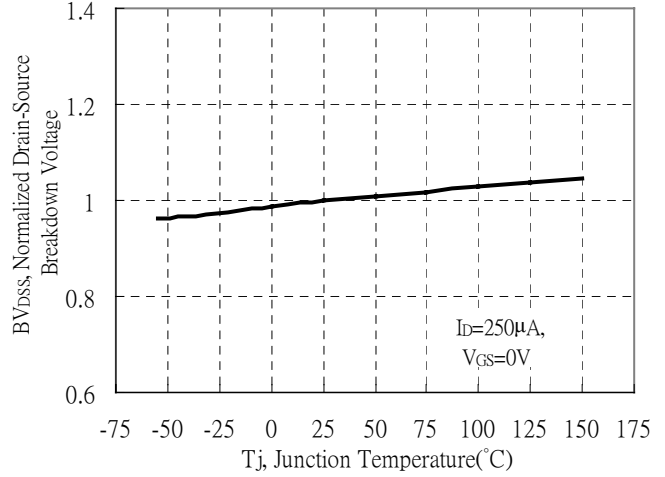


Typical Characteristics : Q1(N-channel)

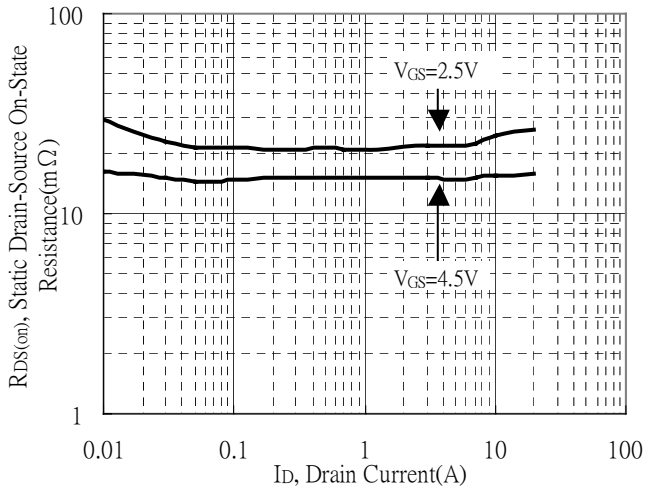
Typical Output Characteristics



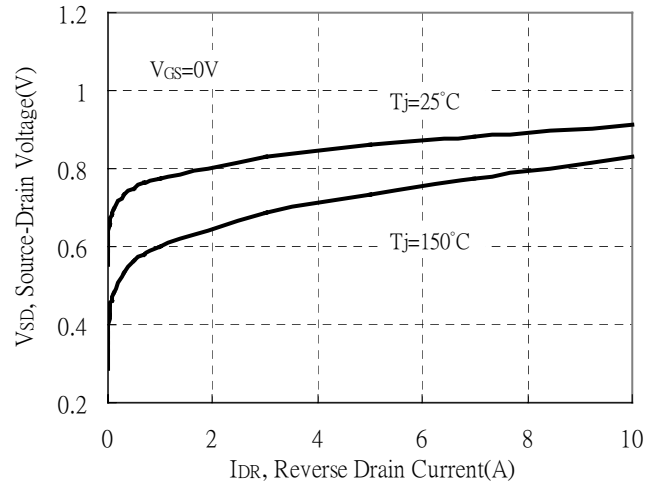
Brekdown Voltage vs Ambient Temperature



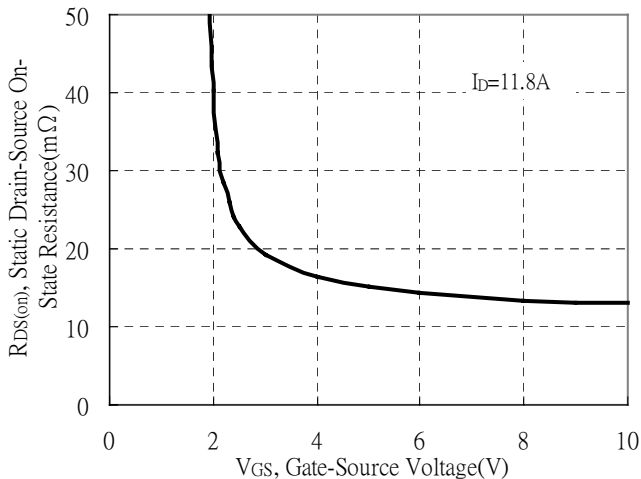
Static Drain-Source On-State resistance vs Drain Current



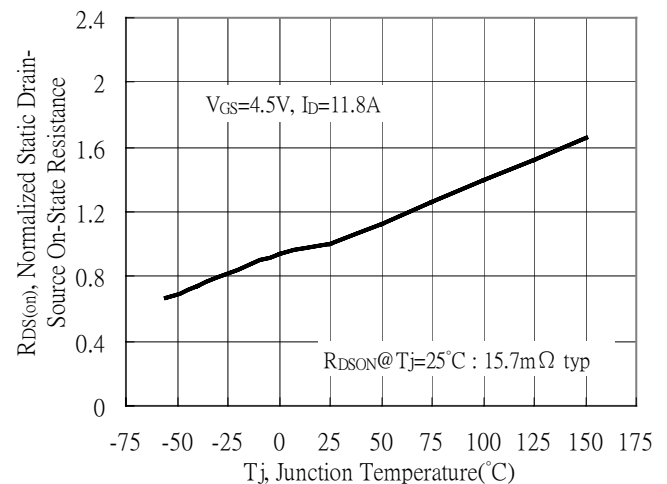
Reverse Drain Current vs Source-Drain Voltage



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

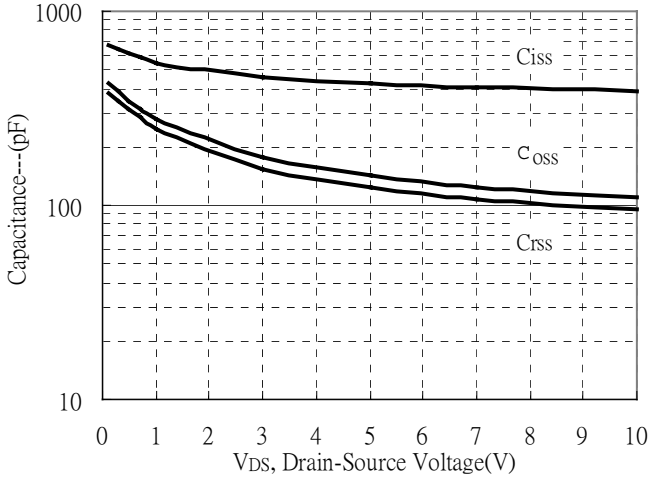


Drain-Source On-State Resistance vs Junction Temperature

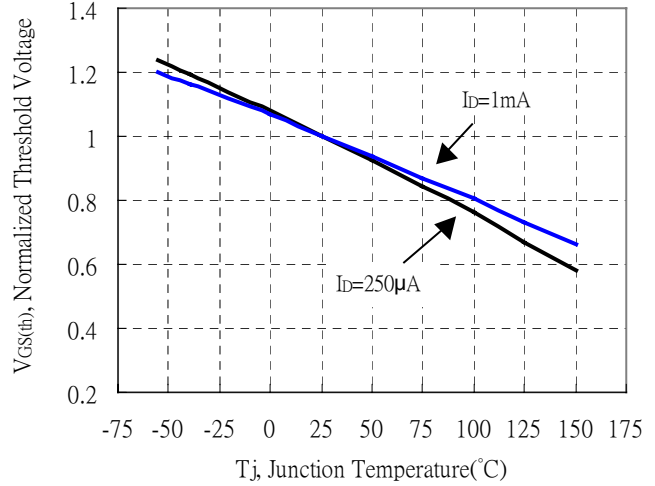


Typical Characteristics(Cont.) : Q1(N-channel)

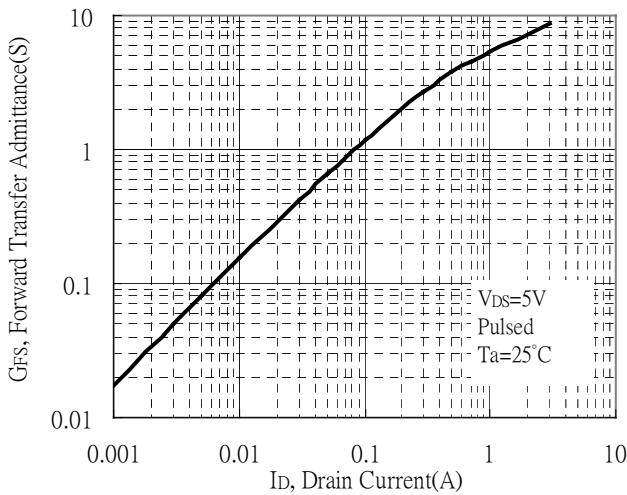
Capacitance vs Drain-to-Source Voltage



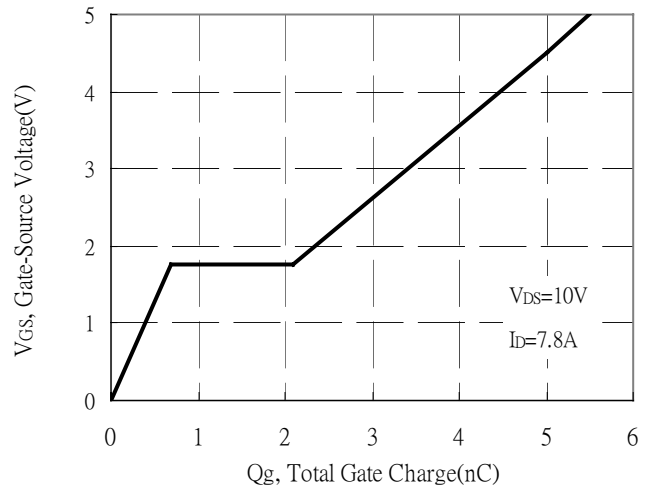
Threshold Voltage vs Junction Temperature



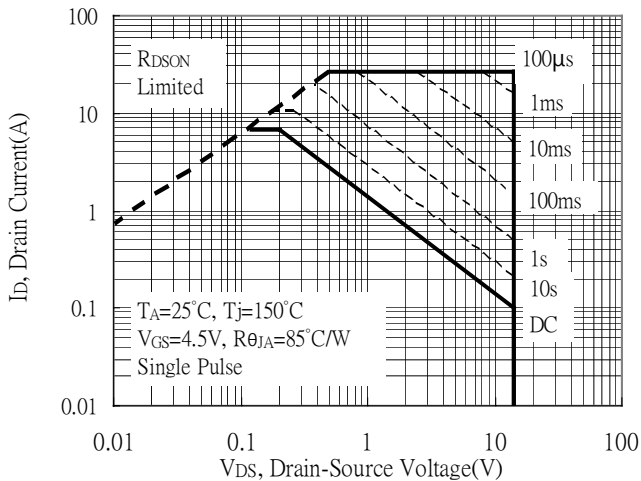
Forward Transfer Admittance vs Drain Current



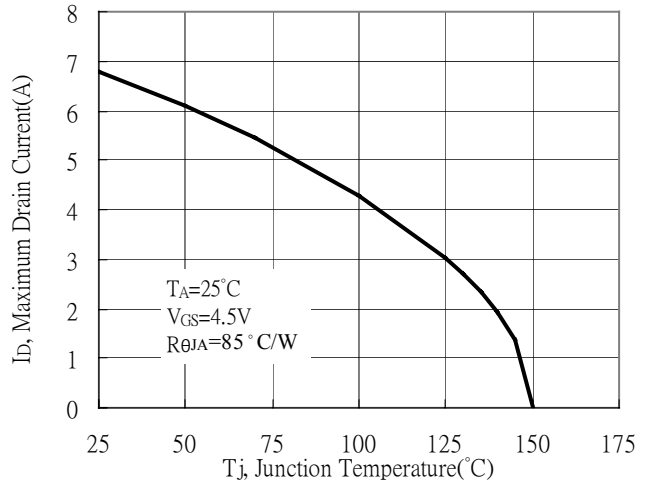
Gate Charge Characteristics



Maximum Safe Operating Area



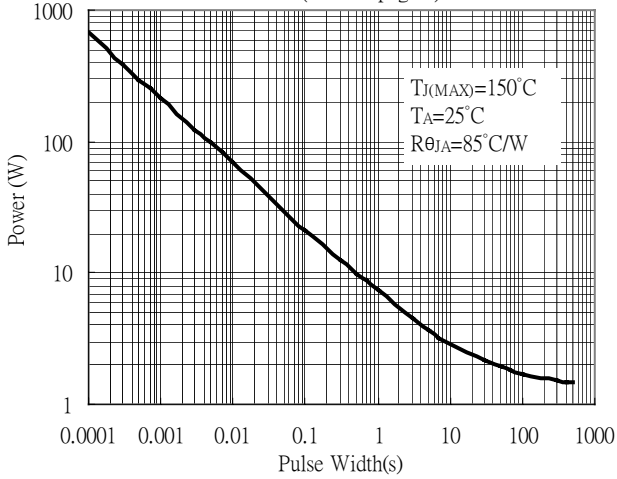
Maximum Drain Current vs Junction Temperature



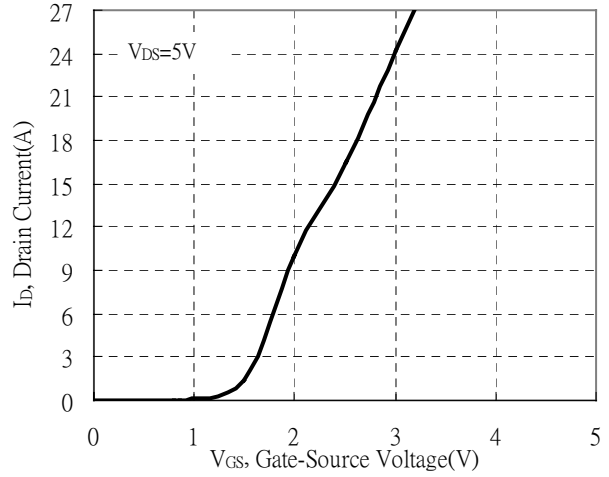


Typical Characteristics(Cont.) : Q1(N-channel)

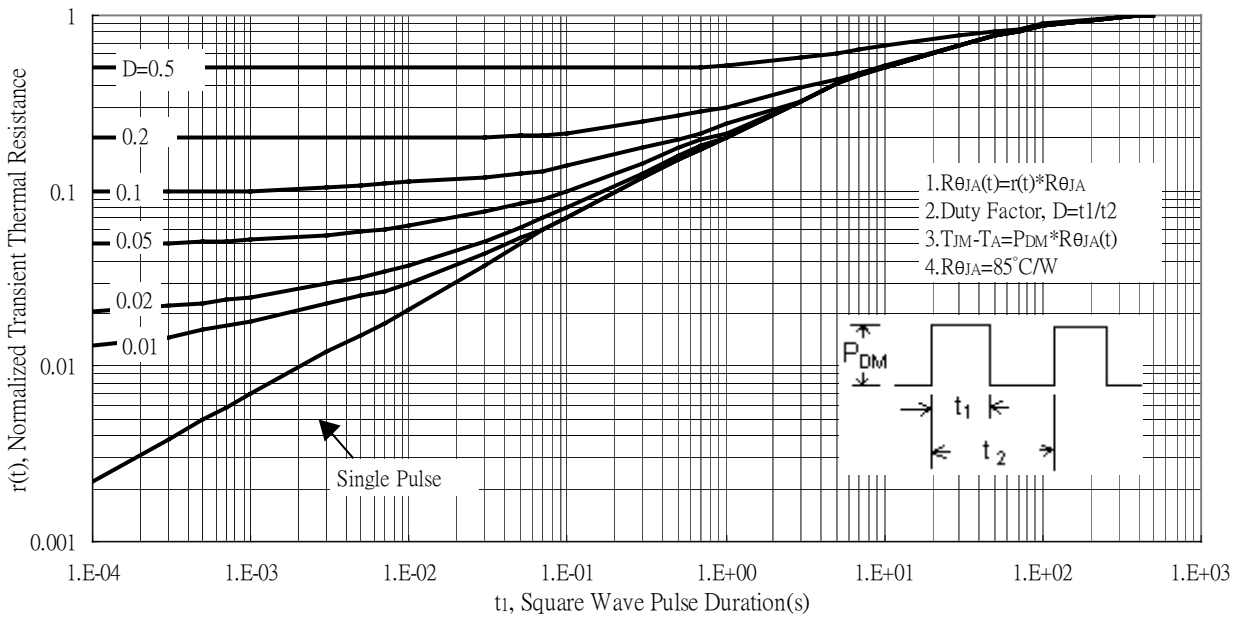
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



Typical Transfer Characteristics

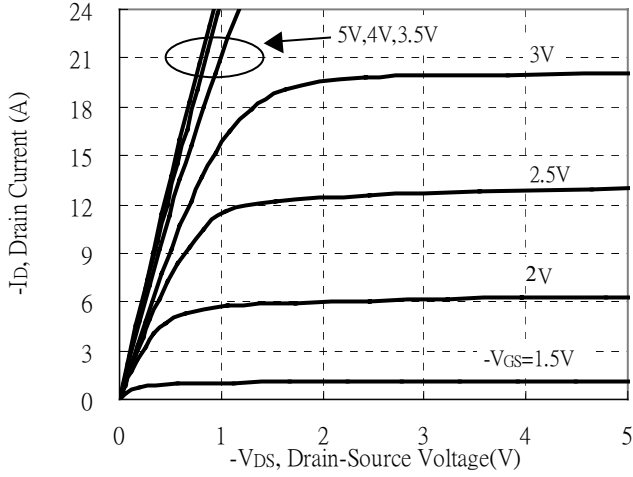


Transient Thermal Response Curves

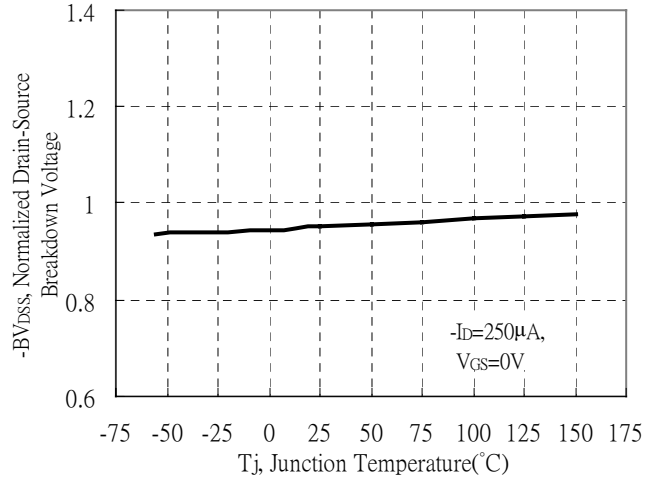


Typical Characteristics : Q2(P-channel)

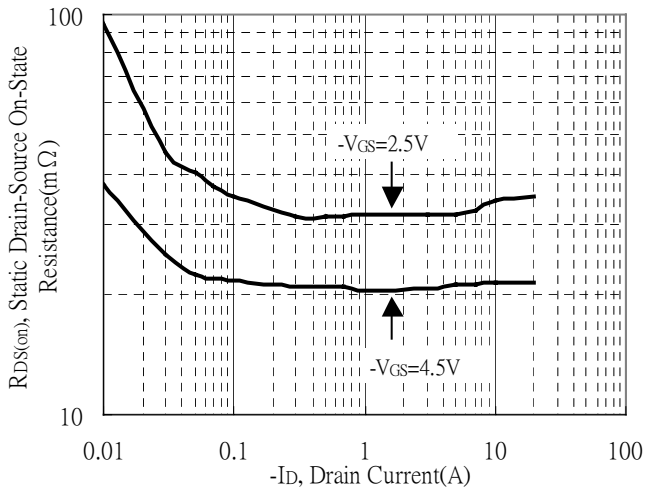
Typical Output Characteristics



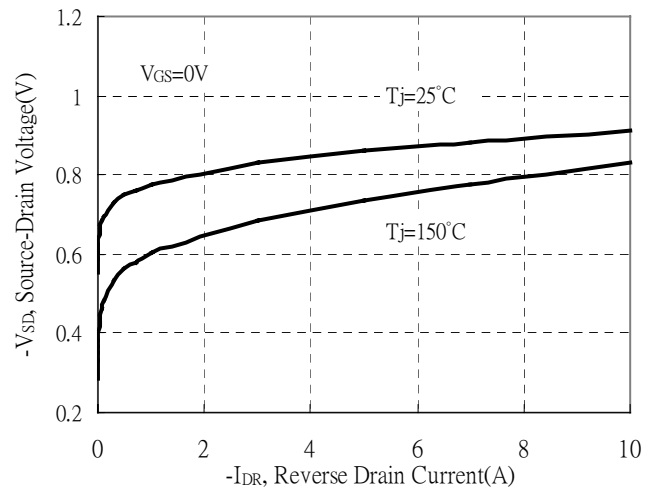
Brekdown Voltage vs Ambient Temperature



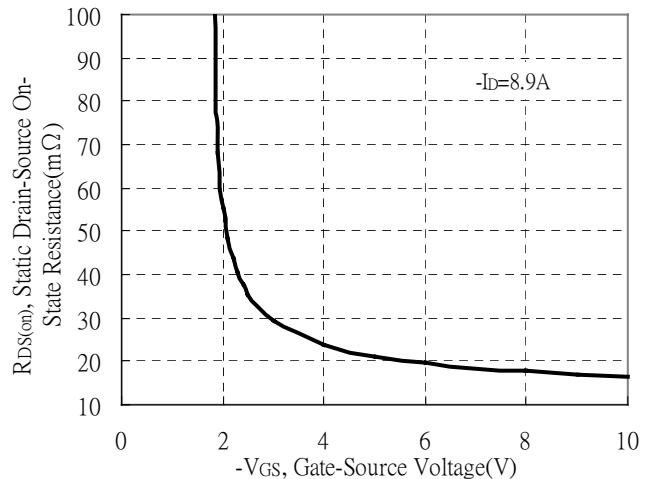
Static Drain-Source On-State resistance vs Drain Current



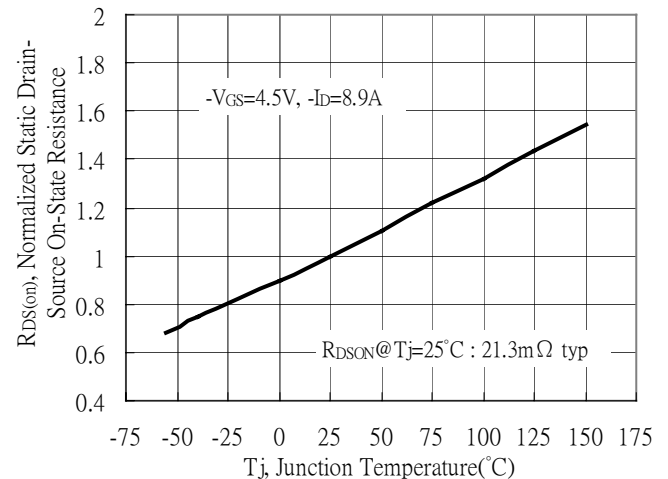
Reverse Drain Current vs Source-Drain Voltage



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



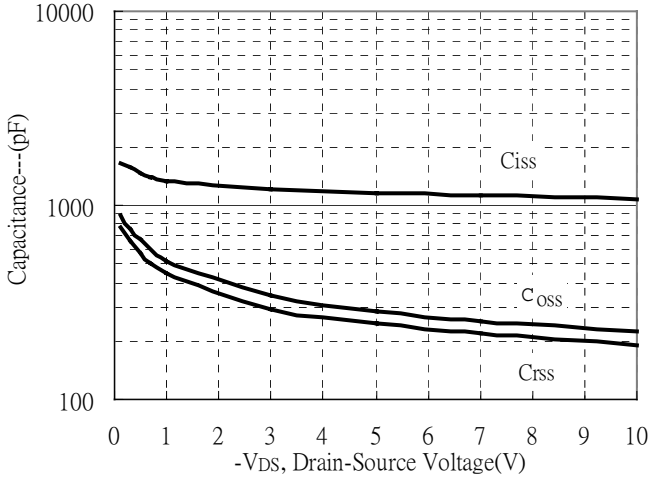
Drain-Source On-State Resistance vs Junction Temperature



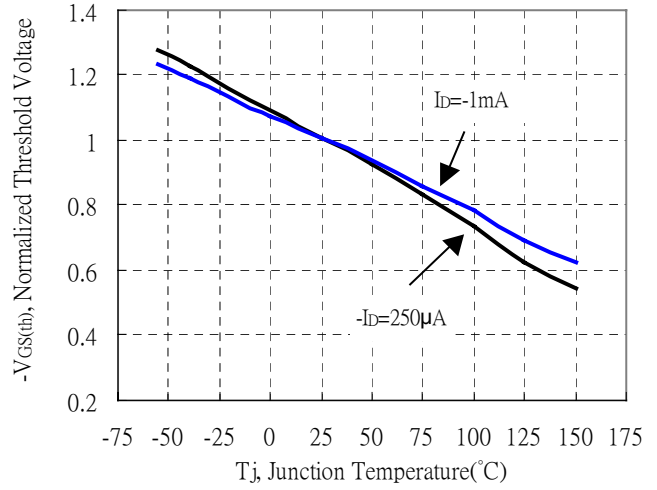


Typical Characteristics(Cont.) : Q2(P-channel)

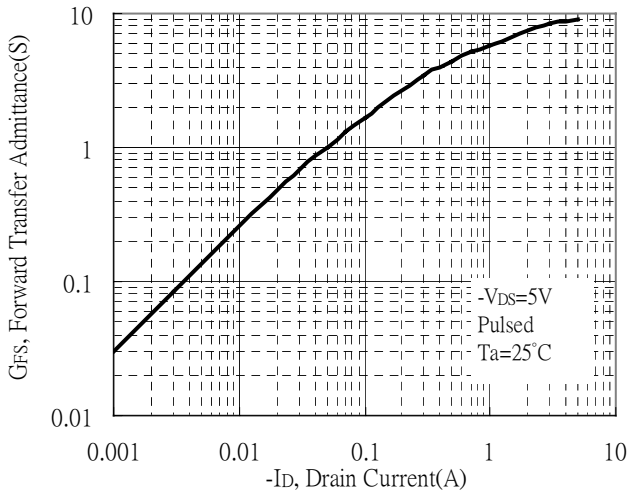
Capacitance vs Drain-to-Source Voltage



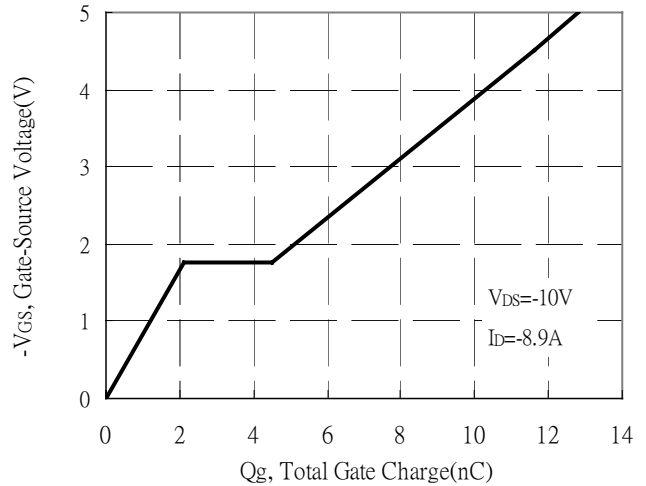
Threshold Voltage vs Junction Temperature



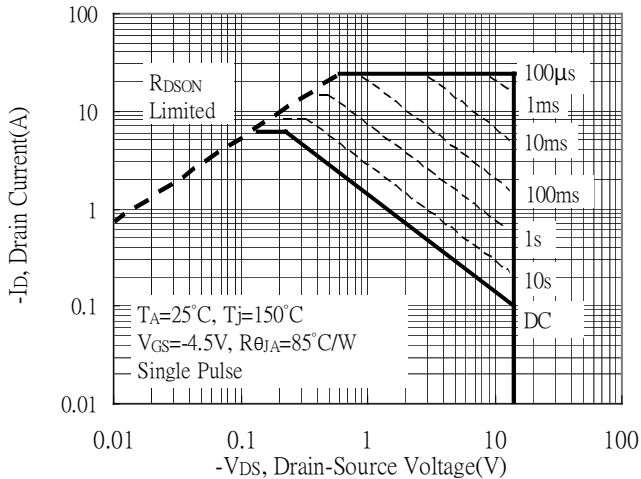
Forward Transfer Admittance vs Drain Current



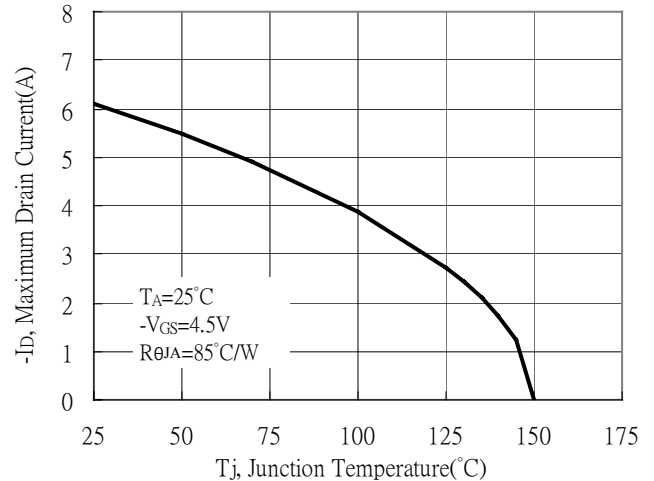
Gate Charge Characteristics



Maximum Safe Operating Area

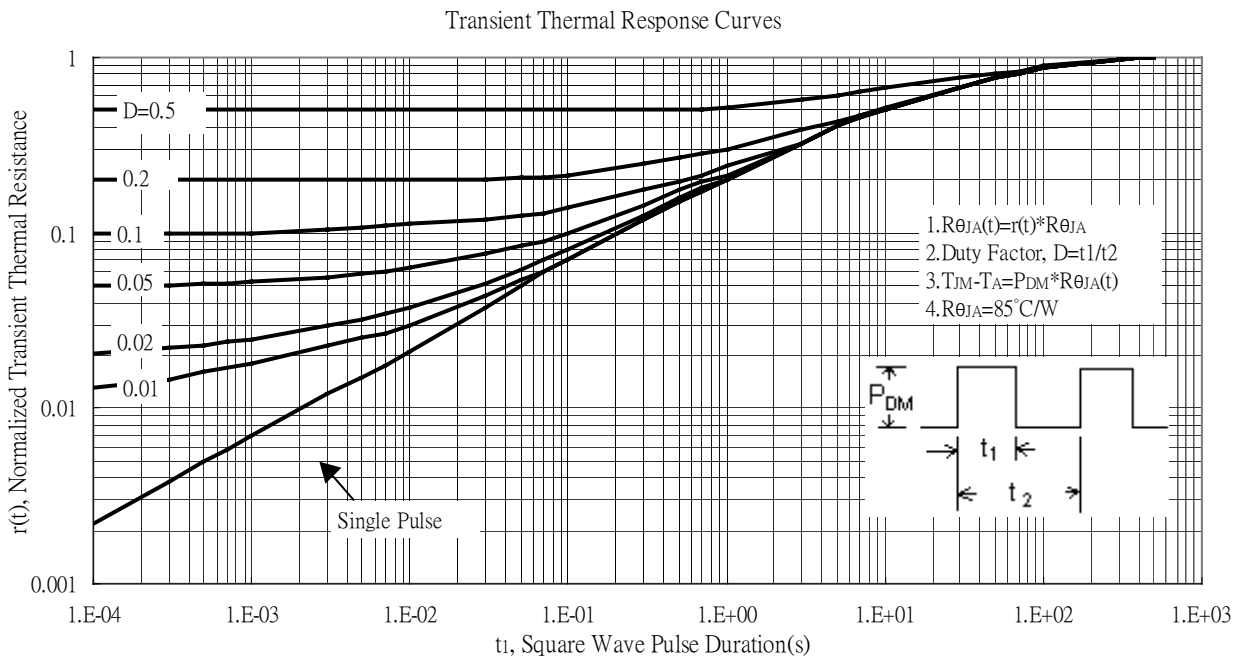
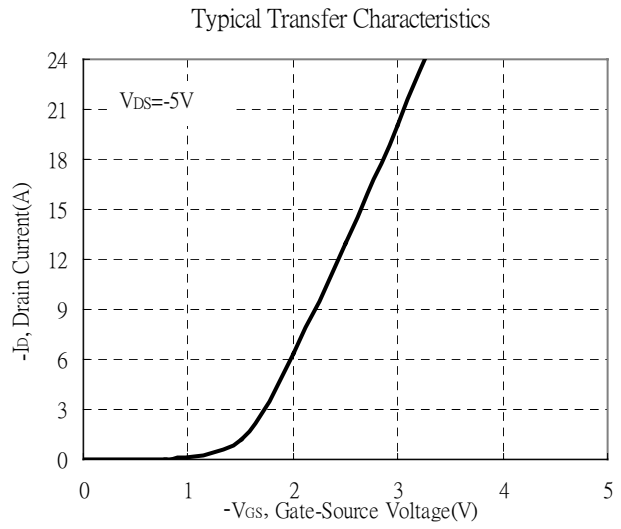
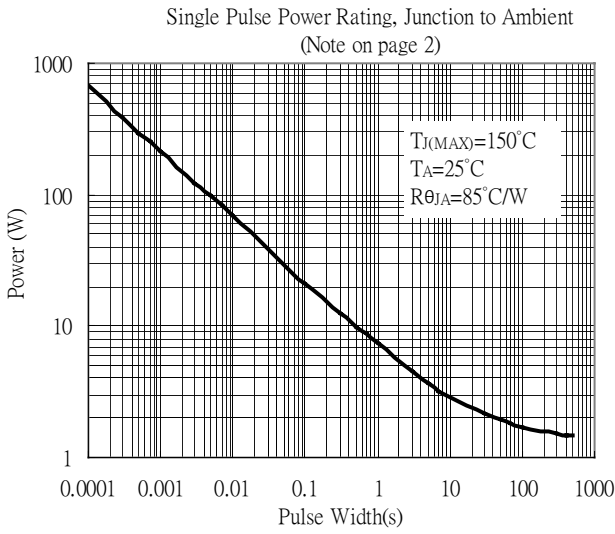


Maximum Drain Current vs Junction Temperature

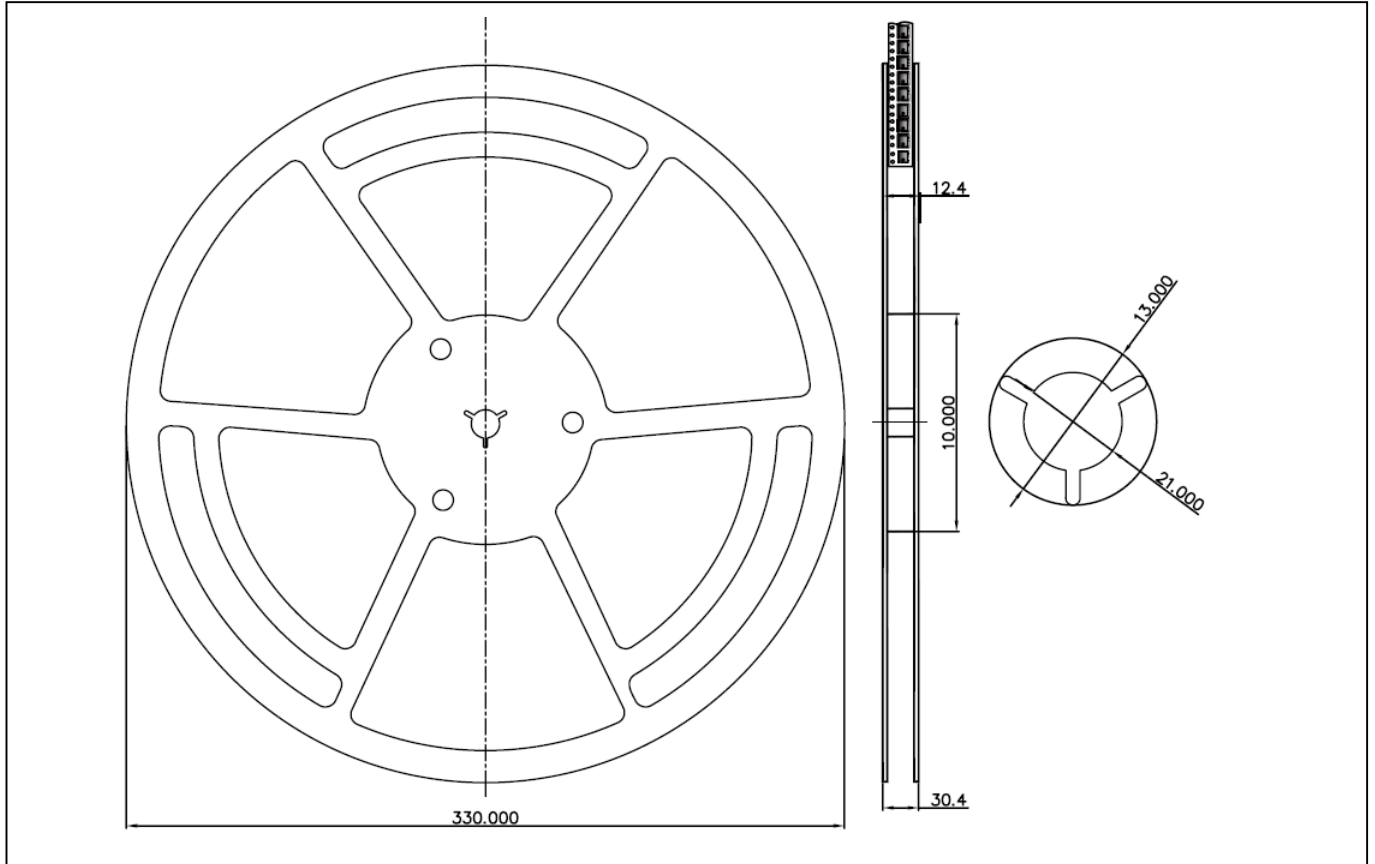




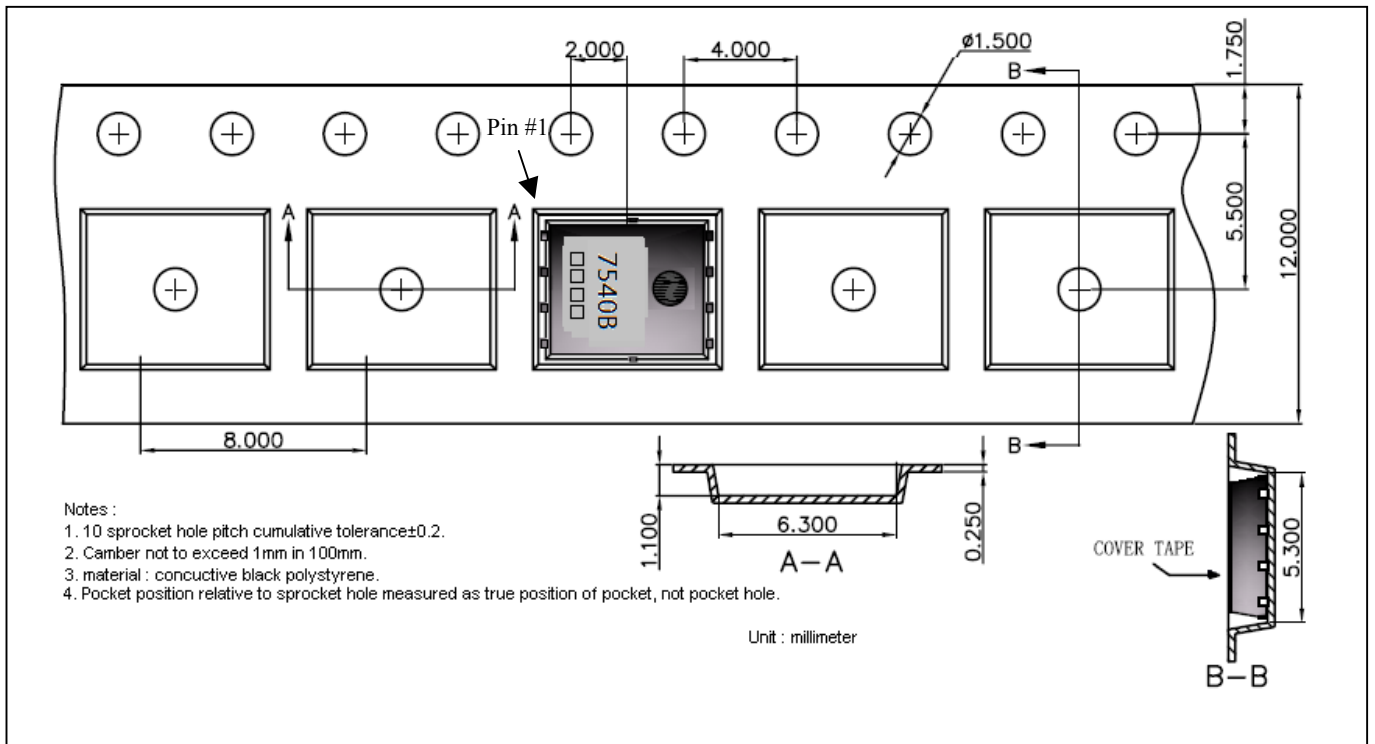
Typical Characteristics(Cont.) : Q2(P-channel)



Reel Dimension



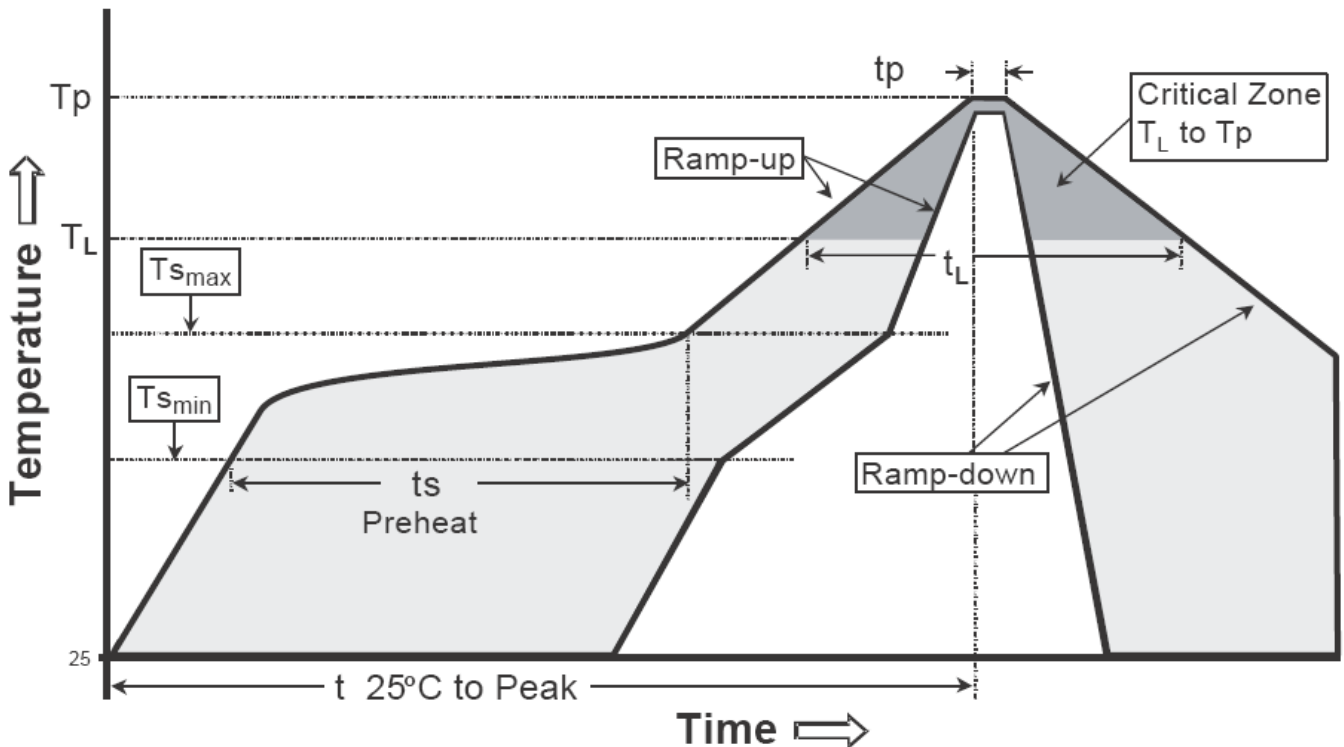
Carrier Tape Dimension



Recommended wave soldering condition

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

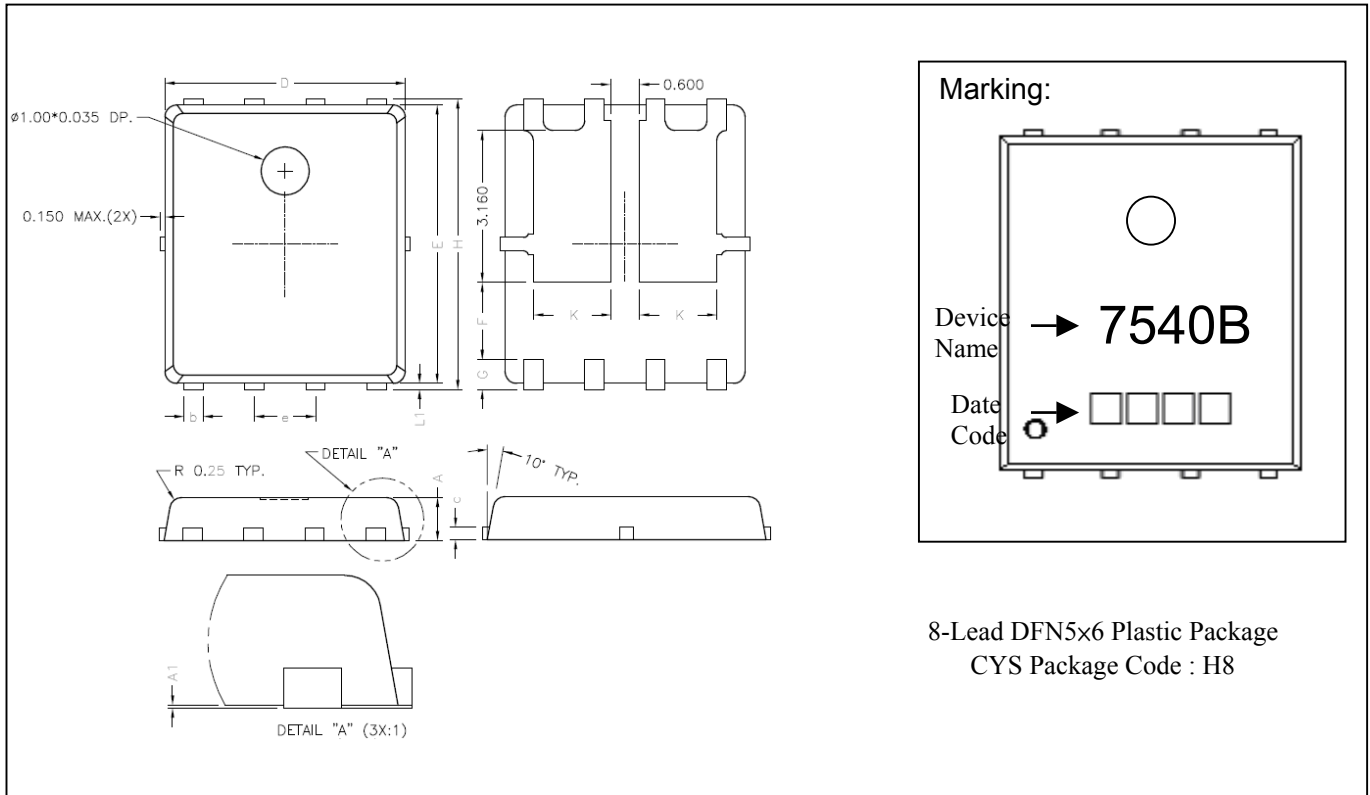
Recommended temperature profile for IR reflow



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(t _p)	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



Marking:

Device Name → **7540B**

Date Code → □□□□

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.

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