

N- AND P-Channel Enhancement Mode MOSFET

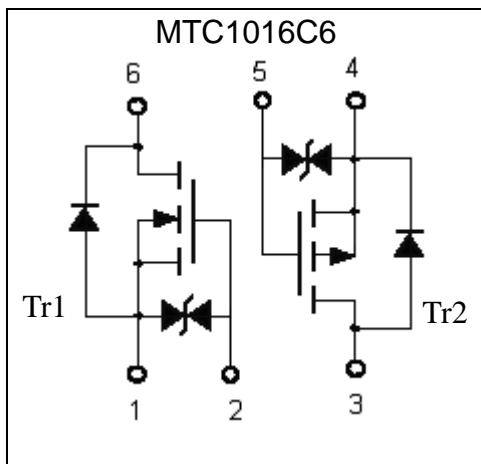
MTC1016C6

	N-CH	P-CH
BV_{DSS}	20V	-20V
$I_D @ V_{GS}=(-)4.5V, T_A=25^\circ C$	0.57A	-0.4A
$R_{DS(on)(typ.)} @ V_{GS}=(-)4.5V$	0.30 Ω	0.61 Ω
$R_{DS(on)(typ.)} @ V_{GS}=(-)2.5V$	0.43 Ω	1.06 Ω
$R_{DS(on)(typ.)} @ V_{GS}=(-)1.8V$	0.63 Ω	1.41 Ω

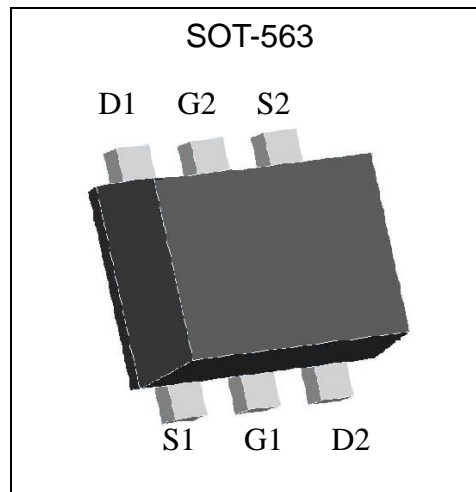
Features

- Low on-resistance
- ESD protected gate
- High speed switching
- Low-voltage drive
- Pb-free lead plating and halogen-free package

Equivalent Circuit

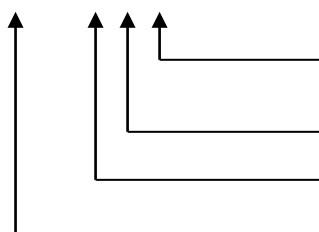


Outline



Ordering Information

Device	Package	Shipping
MTC1016C6-0-T1-G	SOT-563 (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



The following characteristics apply to both Tr1 and Tr2

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

Parameter	Symbol	Limits		Unit
		N-channel	P-channel	
Drain-Source Breakdown Voltage	BV _{DSS}	20	-20	V
Gate-Source Voltage	V _{GS}	±8	±8	
Continuous Drain Current @TA=25 °C, VGS=4.5V(-4.5V)	I _D	0.57	-0.40	A
Continuous Drain Current @TA=70 °C, VGS=4.5V(-4.5V)		0.46	-0.32	
Pulsed Drain Current (Note 1)	I _{DM}	3.4	-1.7	
Power Dissipation @TA=25°C	P _D	0.15		W
Power Dissipation @TA=70°C		0.1		
Operating Junction and Storage Temperature Range	T _j ; T _{stg}	-55~+150		°C

Note : 1. Pulse width limited by maximum junction temperature.
 2. Pulse width ≤ 300µs, duty cycle ≤ 2%.
 3. Surface mounted on minimum pad of FR-4 board, t ≤ 5s.

Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance, Junction-to-Ambient(PCB mounted) (Note)	R _{th,ja}	833	°C/W

Note : Surface mounted on minimum pad of FR-4 board, t ≤ 5s.

N-Channel Electrical Characteristics (Tj=25°C, unless otherwise noted)

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}	-	-	±5	µA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	1		V _{DS} =20V, V _{GS} =0V
	-	-	10		V _{DS} =16V, V _{GS} =0V (T _j =70°C)
*R _{DS(ON)}	-	0.30	0.40	Ω	V _{GS} =4.5V, I _D =600mA
	-	0.43	0.65		V _{GS} =2.5V, I _D =400mA
	-	0.63	1.07		V _{GS} =1.8V, I _D =350mA
*G _{FS}	-	1.1	-	S	V _{DS} =10V, I _D =400mA
Dynamic					
C _{iSS}	-	58.5	-	pF	V _{DS} =16V, V _{GS} =0V, f=1MHz
C _{oSS}	-	12.3	-		
C _{rSS}	-	7.8	-		
t _{d(ON)}	-	6	-	ns	V _{DS} =10V, I _D =250mA, V _{GS} =4.5V, R _G =10Ω
t _r	-	6	-		
t _{d(OFF)}	-	26	-		
t _f	-	20	-		



Qg	-	0.79	-	nC	V _{DS} =10V, I _D =250mA, V _{GS} =4.5V
Qgs	-	0.09	-		
Qgd	-	0.27	-		
Source-Drain Diode					
*I _S	-	-	0.57	A	
*I _{SM}	-	-	2.3		
*V _{SD}	-	0.75	1.0	V	V _{GS} =0V, I _S =150mA

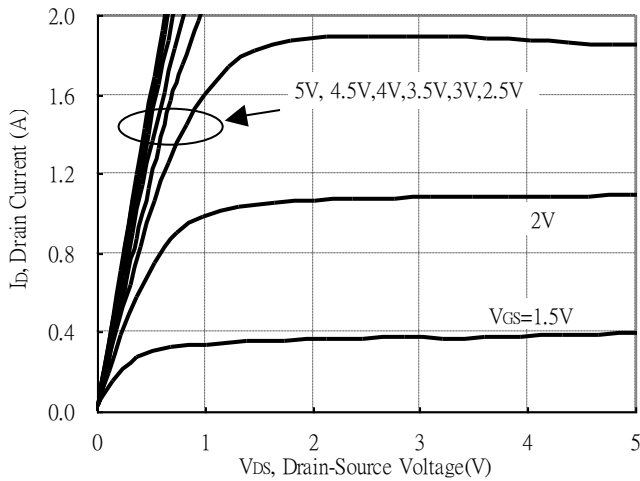
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

P-Channel Electrical Characteristics (T_j=25°C, unless otherwise noted)

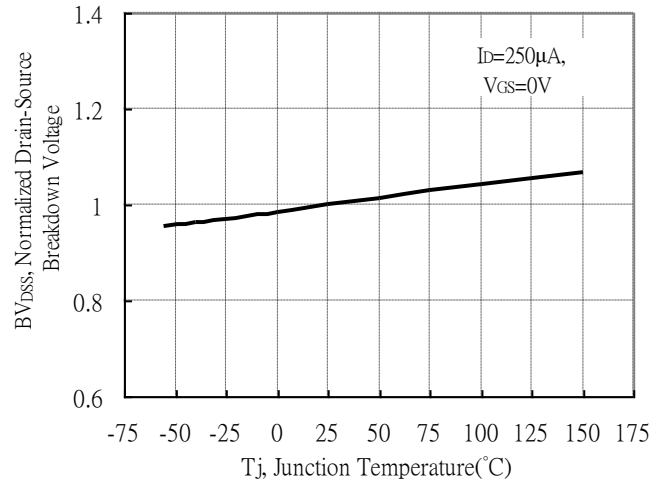
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	-20	-	-	V	V _{GS} =0V, I _D =-250μA
V _{GS(th)}	-0.5	-	-1.2		V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±5	μA	V _{GS} =±8V, V _{DS} =0V
I _{DSS}	-	-	-1		V _{DS} =-20V, V _{GS} =0V
	-	-	-10		V _{DS} =-16V, V _{GS} =0V (T _j =70°C)
*R _{DS(ON)}	-	0.61	0.83	Ω	V _{GS} =-4.5V, I _D =-430mA
	-	0.65	0.96		V _{GS} =-4V, I _D =-300mA
	-	1.06	1.60		V _{GS} =-2.5V, I _D =-300mA
	-	1.41	2.40		V _{GS} =-1.8V, I _D =-10mA
*G _{FS}	-	0.7	-	S	V _{DS} =-10V, I _D =-250mA
Dynamic					
C _{iSS}	-	54.7	-	pF	V _{DS} =-16V, V _{GS} =0V, f=1MHz
C _{oSS}	-	16.6	-		
C _{rSS}	-	11.9	-		
t _{d(ON)}	-	6	-	ns	V _{DS} =-10V, I _D =-250mA, V _{GS} =-4.5V, R _G =10Ω
t _r	-	10	-		
t _{d(OFF)}	-	23	-		
t _f	-	28	-		
Qg	-	1.13	-	nC	V _{DS} =-10V, I _D =-250mA, V _{GS} =-4.5V
Qgs	-	0.09	-		
Qgd	-	0.42	-		
Source-Drain Diode					
*I _S	-	-	-0.4	A	
*I _{SM}	-	-	-1.7		
*V _{SD}	-	-0.78	-1.2	V	V _{GS} =0V, I _S =-150mA

N-Channel Typical Characteristics

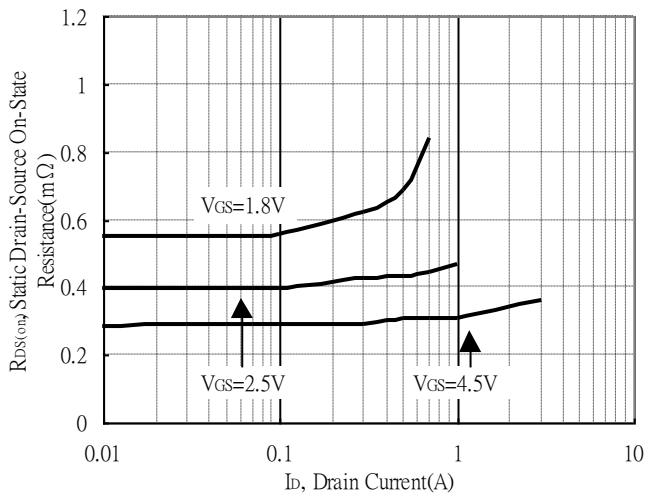
Typical Output Characteristics



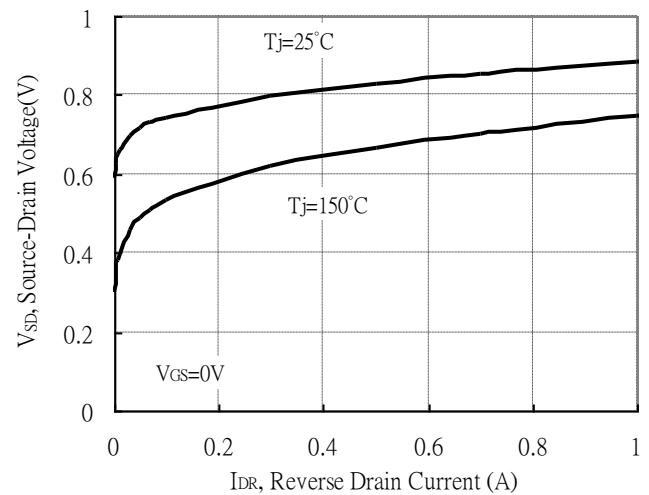
Breakdown Voltage vs Ambient Temperature



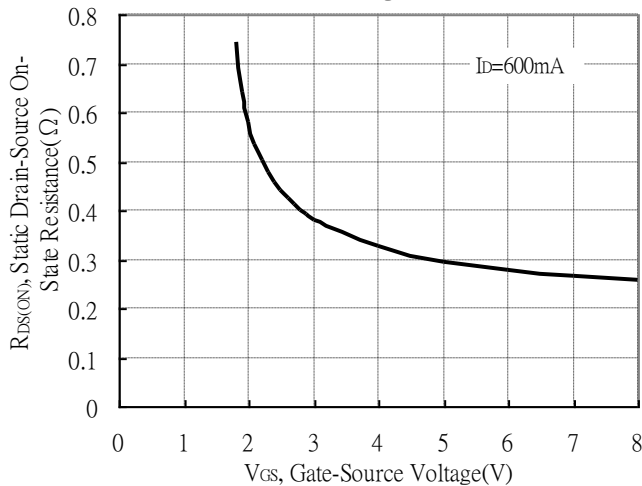
Static Drain-Source On-State resistance vs Drain Current



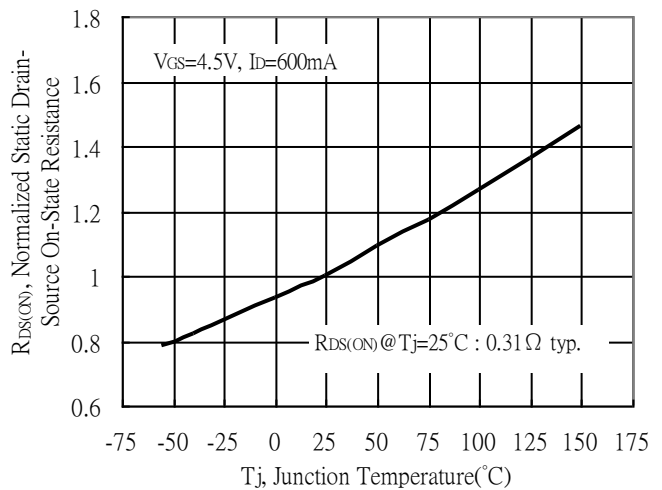
Reverse Drain Current vs Source-Drain Voltage



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

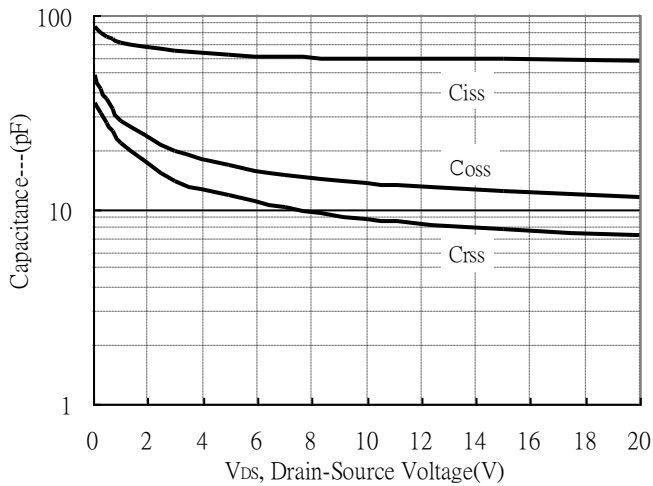


Drain-Source On-State Resistance vs Junction Temperature

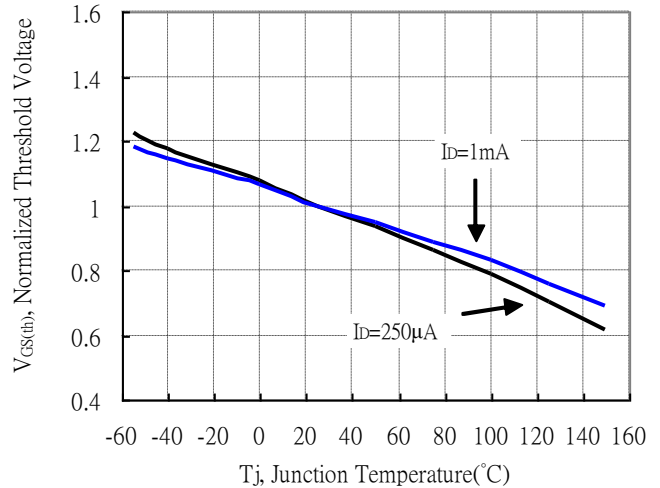


N-Channel Typical Characteristics(Cont.)

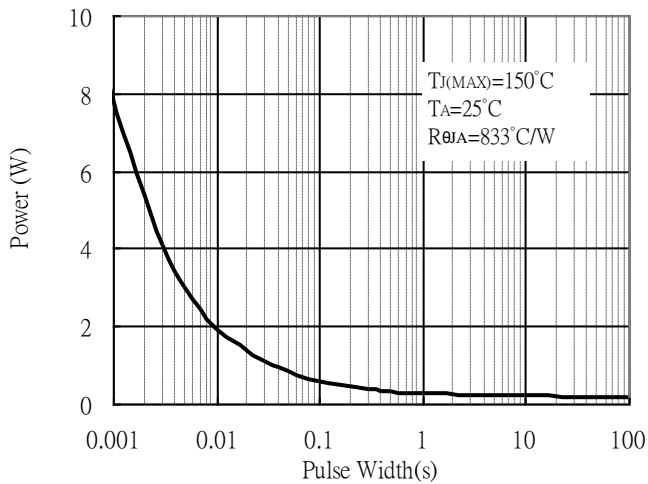
Capacitance vs Drain-to-Source Voltage



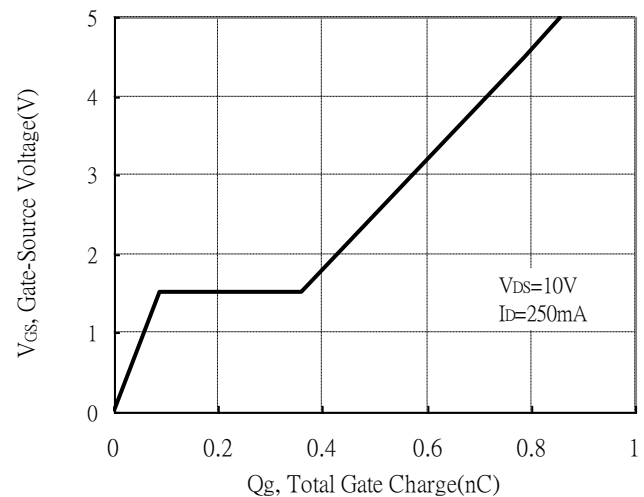
Threshold Voltage vs Junction Temperature



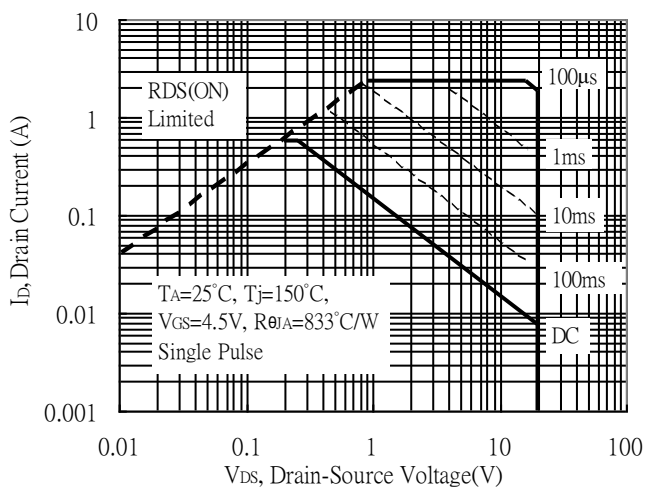
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



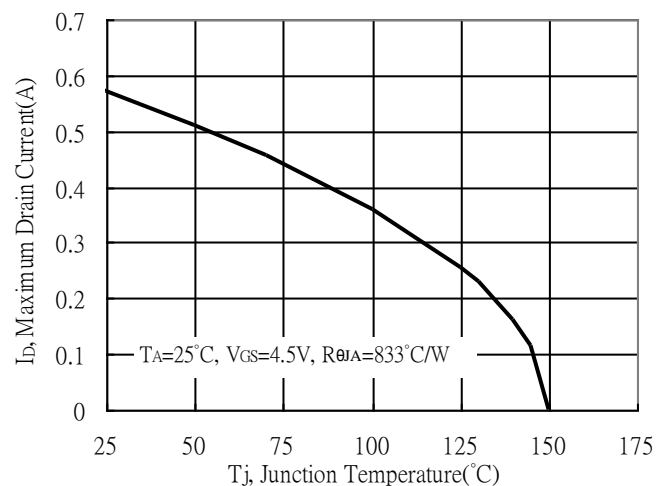
Gate Charge Characteristics



Maximum Safe Operating Area

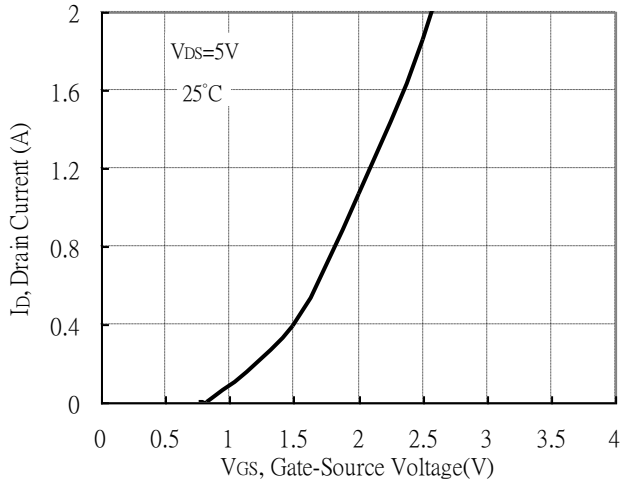


Maximum Drain Current vs Junction Temperature

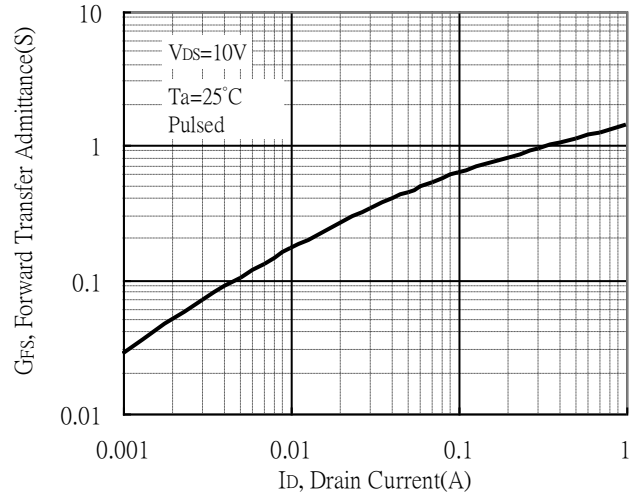


N-Channel Typical Characteristics(Cont.)

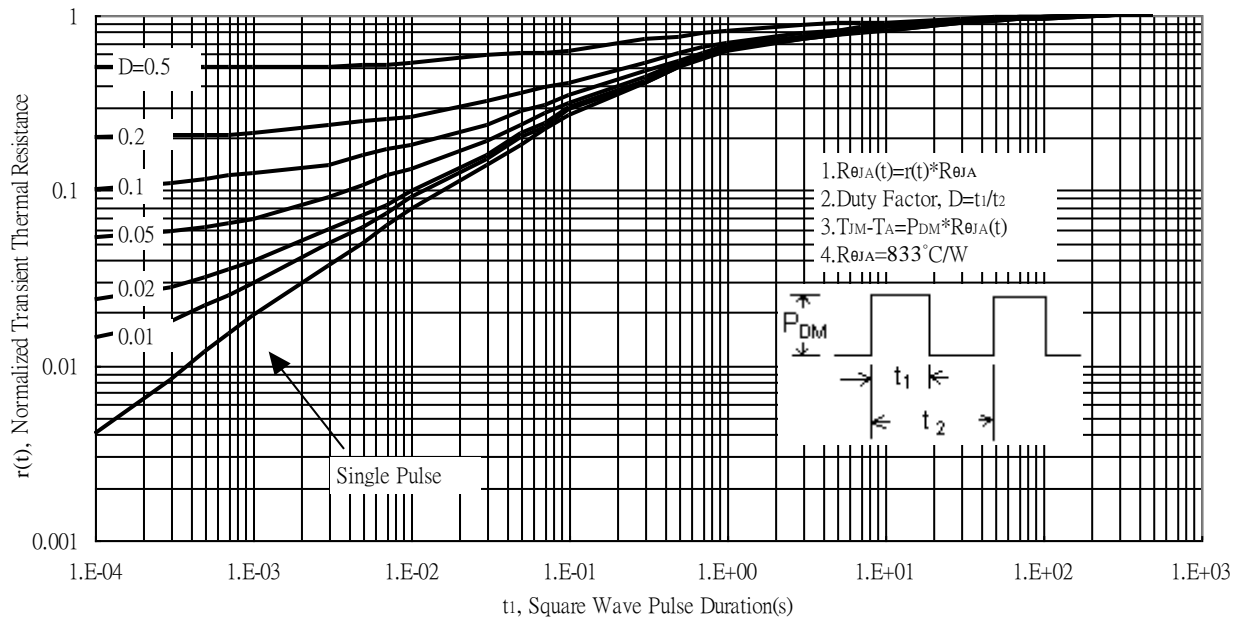
Typical Transfer Characteristics



Forward Transfer Admittance vs Drain Current

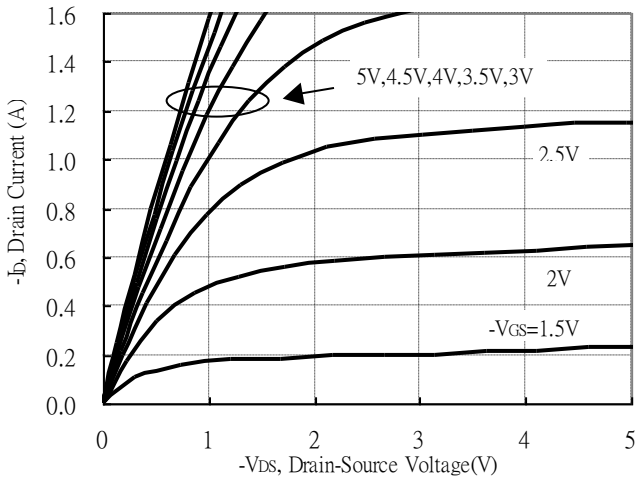


Transient Thermal Response Curves

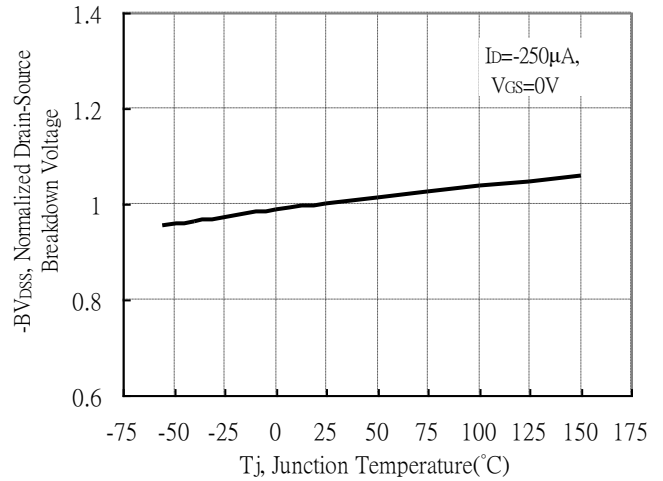


P-Channel Typical Characteristics

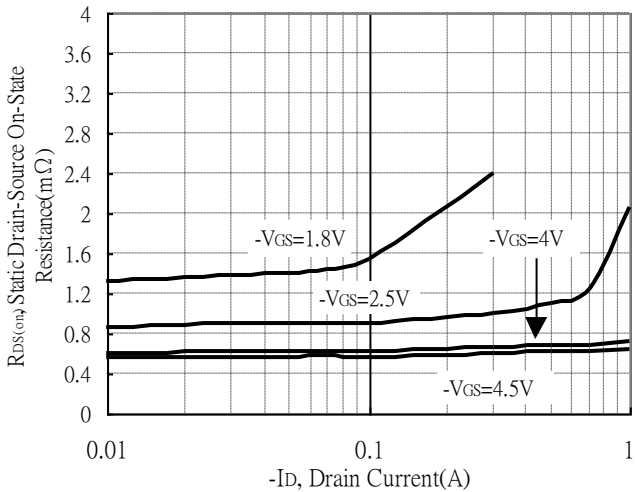
Typical Output Characteristics



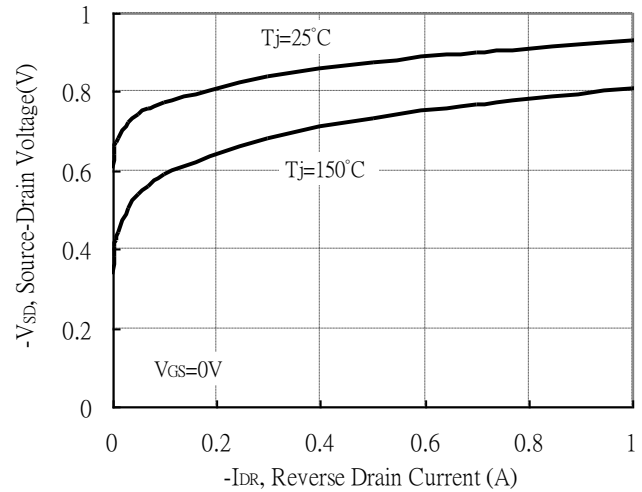
Brekdown Voltage vs Ambient Temperature



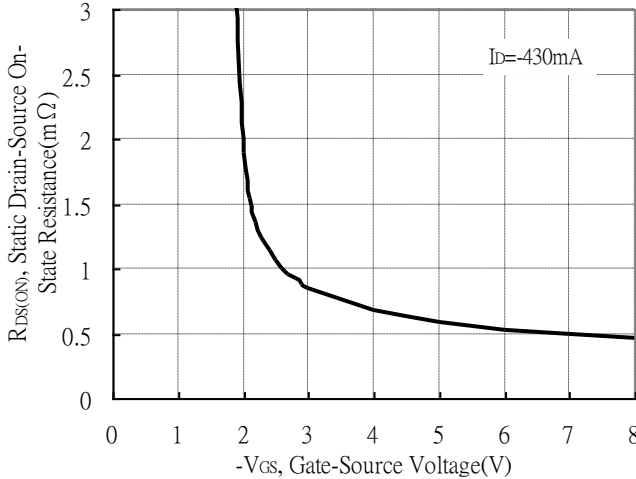
Static Drain-Source On-State resistance vs Drain Current



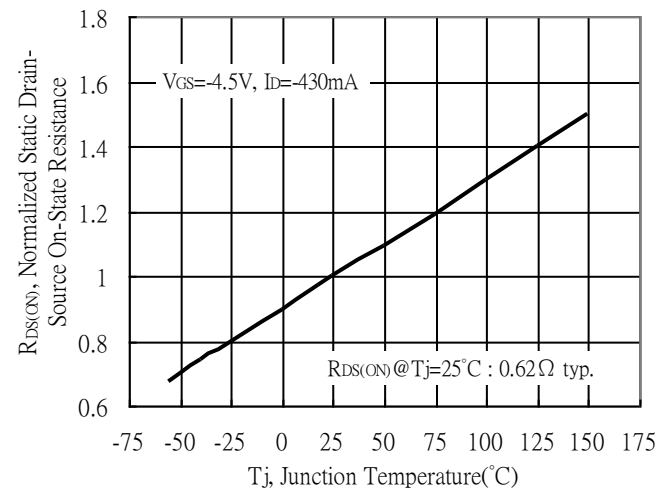
Reverse Drain Current vs Source-Drain Voltage



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

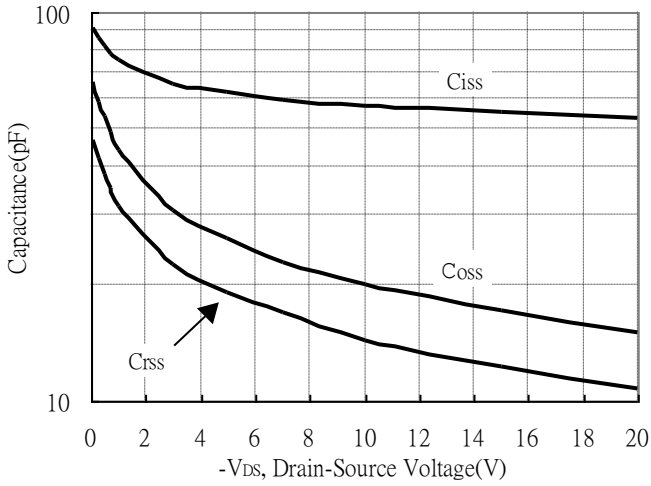


Drain-Source On-State Resistance vs Junction Temperature

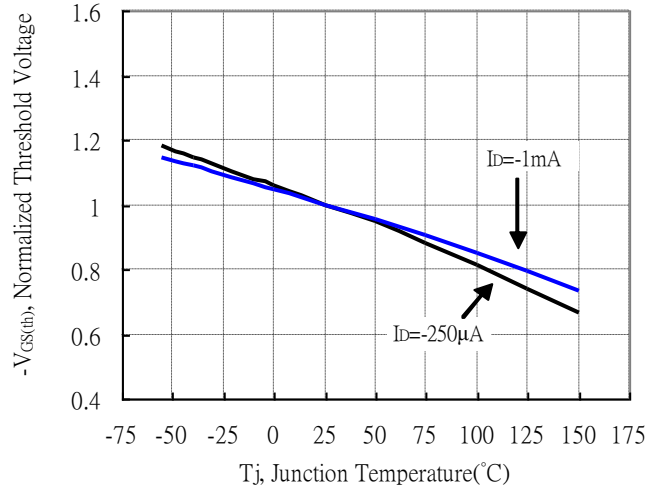


P-Channel Typical Characteristics(Cont.)

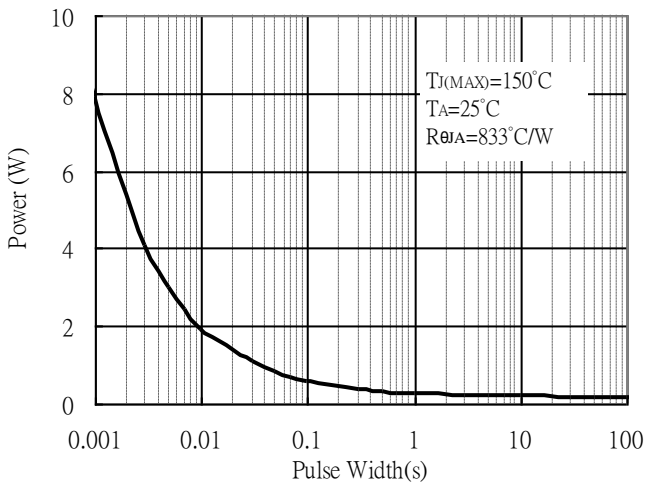
Capacitance vs Drain-to-Source Voltage



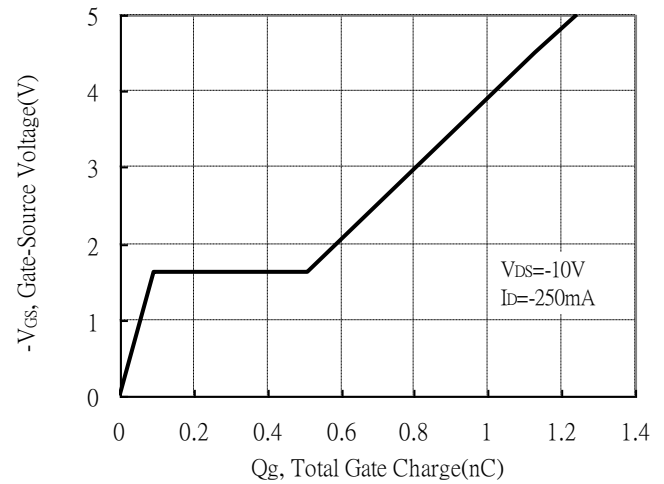
Threshold Voltage vs Junction Temperature



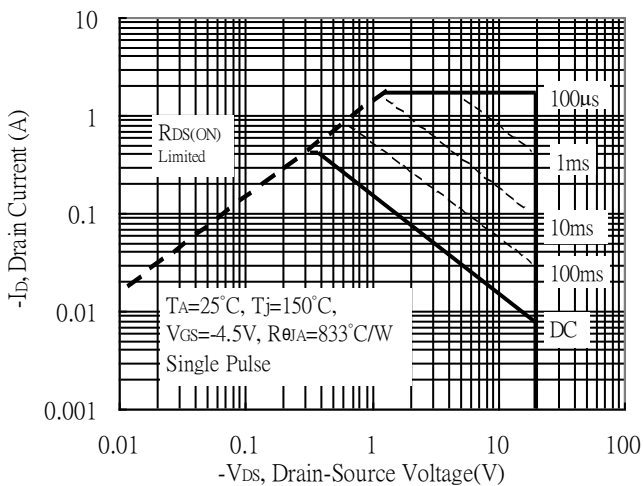
Single Pulse Power Rating, Junction to Ambient
 (Note on page 2)



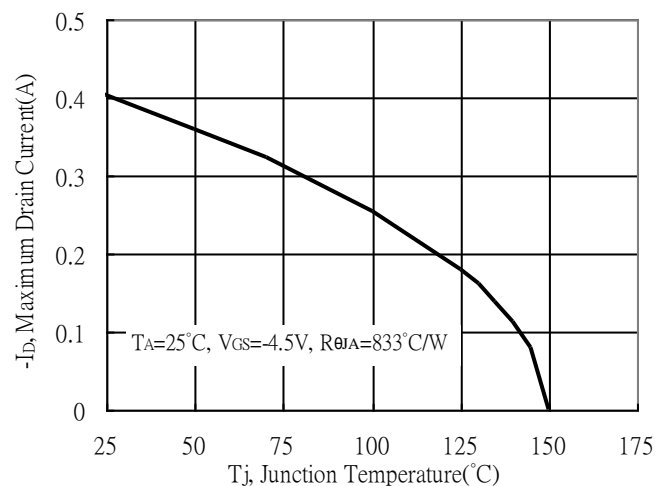
Gate Charge Characteristics



Maximum Safe Operating Area

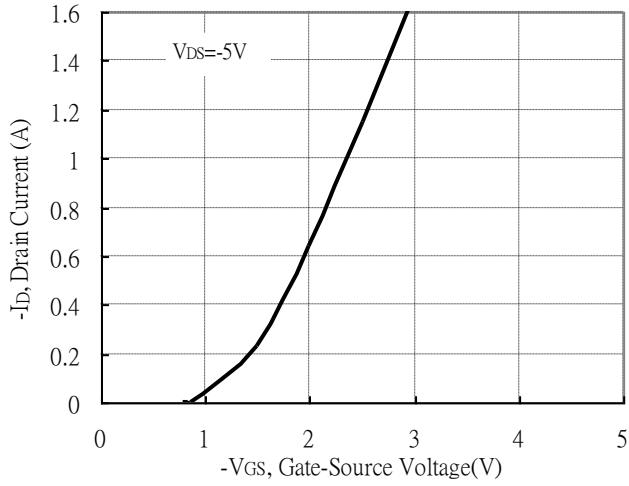


Maximum Drain Current vs Junction Temperature

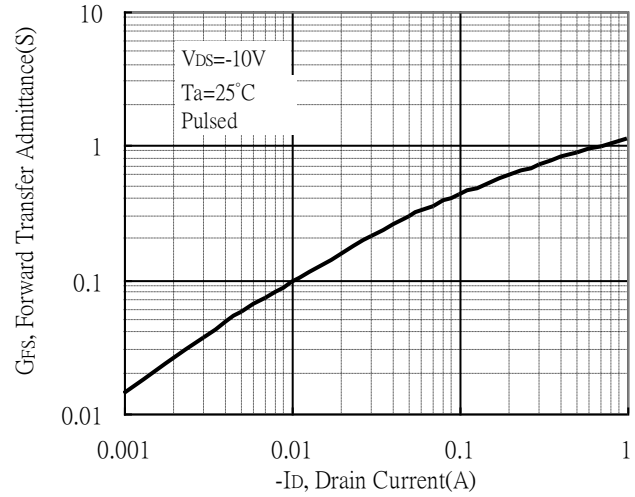


P-Channel Typical Characteristics(Cont.)

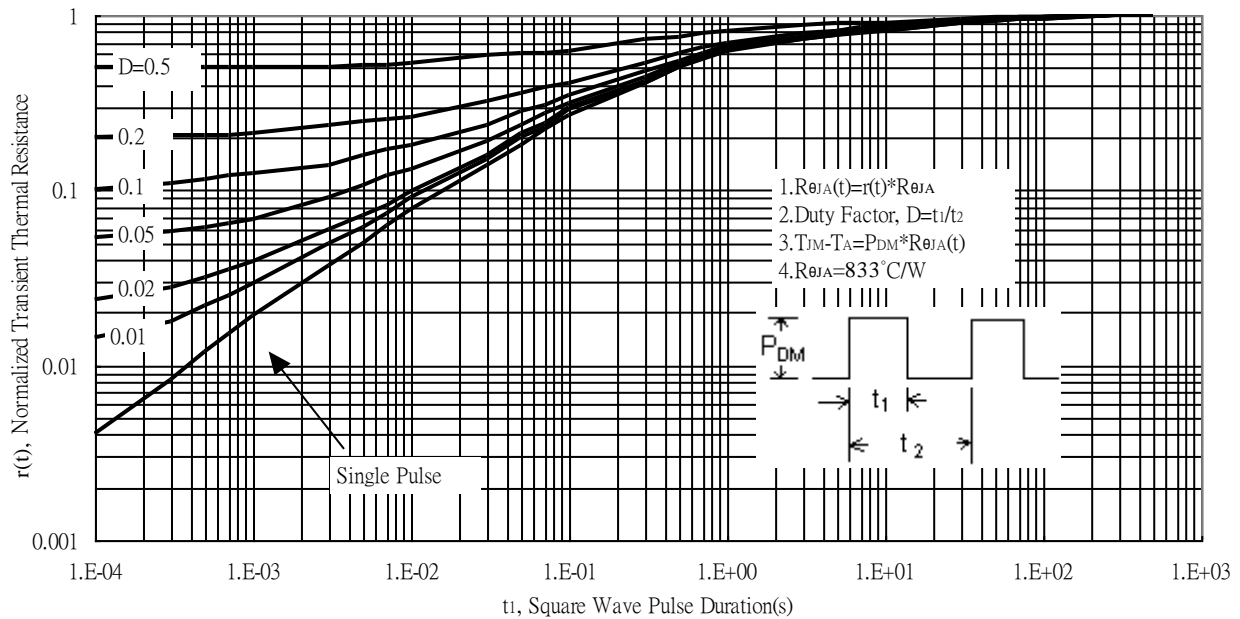
Typical Transfer Characteristics



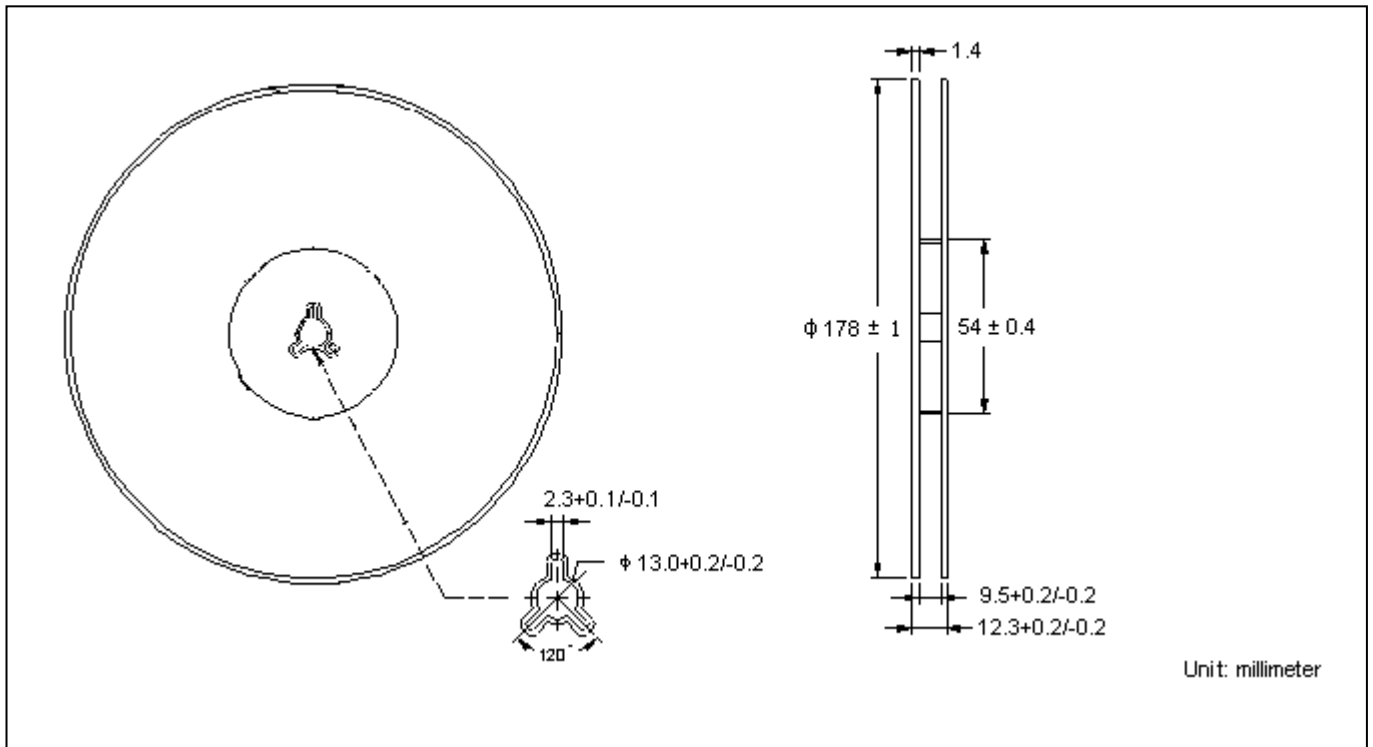
Forward Transfer Admittance vs Drain Current



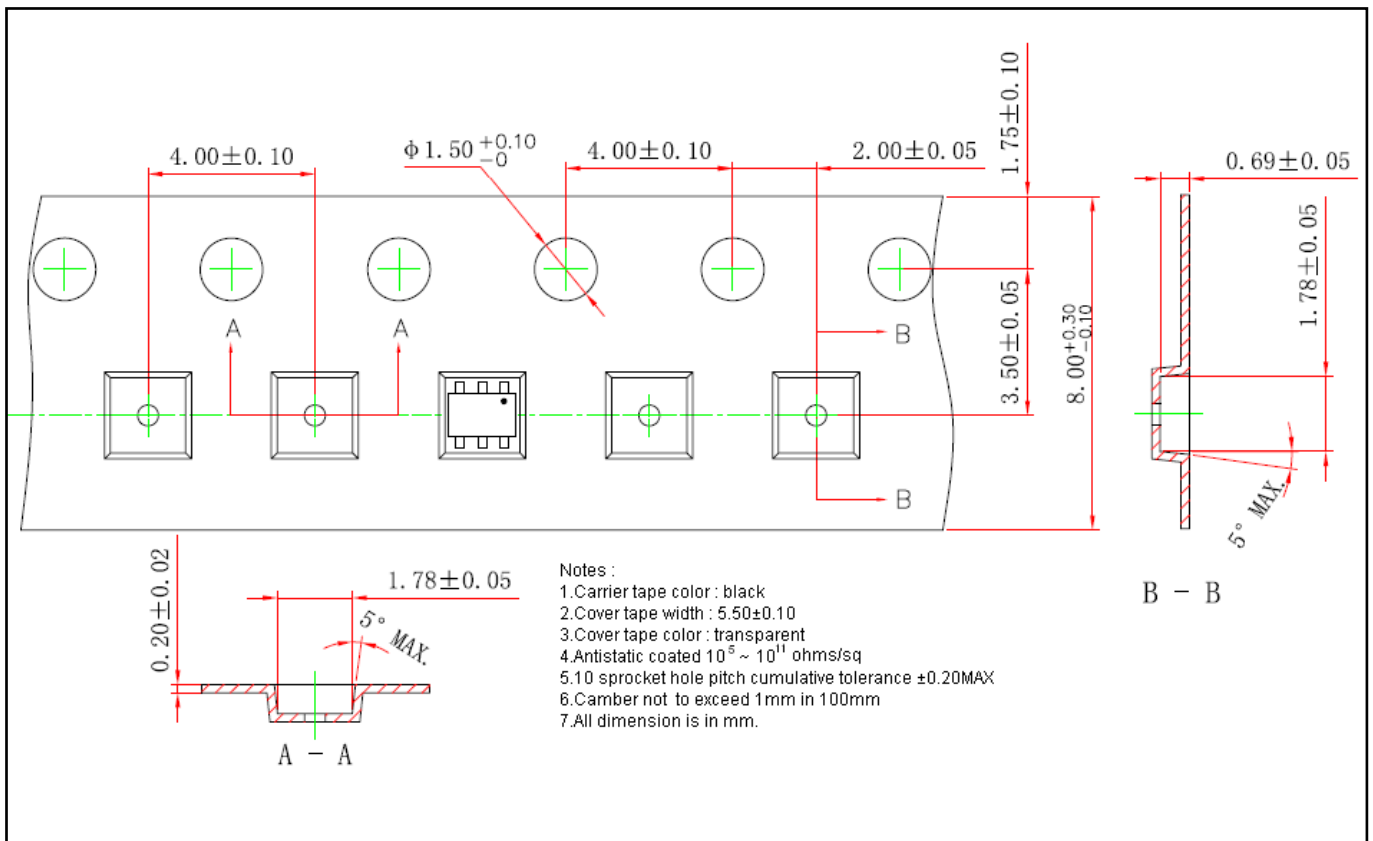
Transient Thermal Response Curves



Reel Dimension



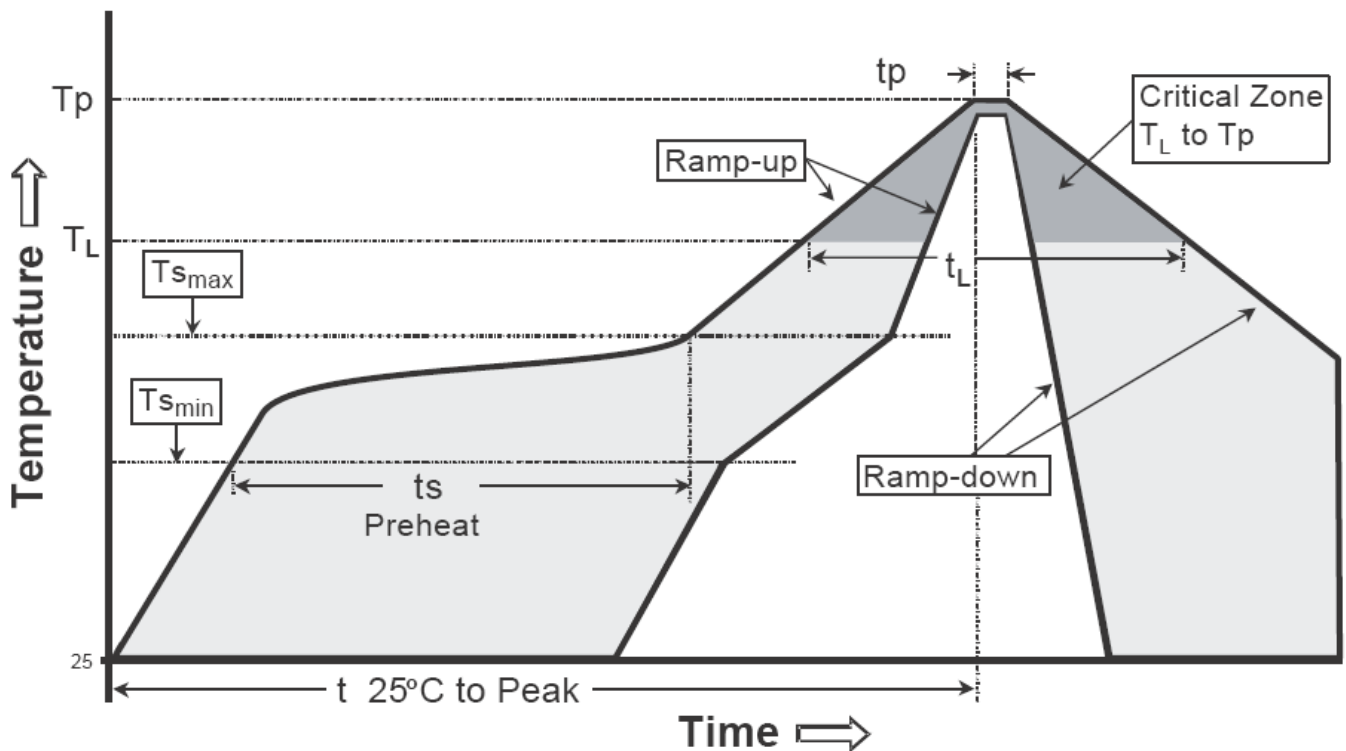
Carrier Tape Dimension



Recommended wave soldering condition

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

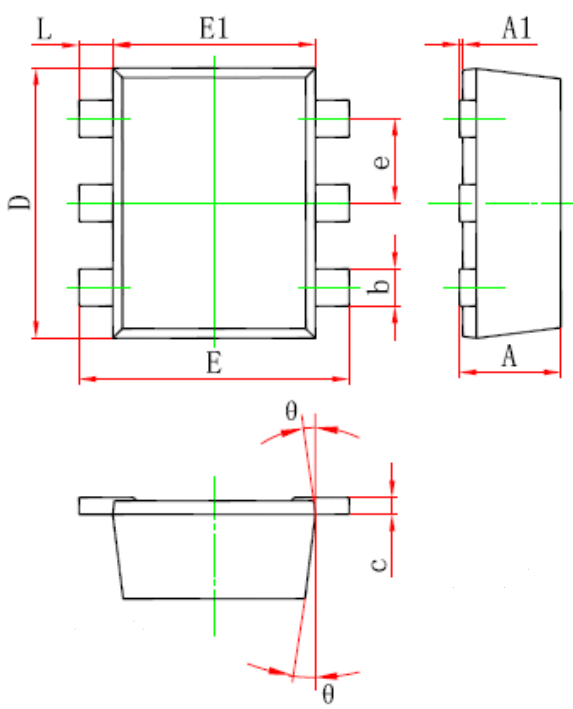
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (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(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.

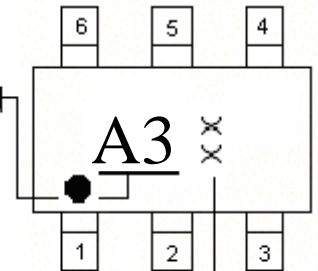
Note : All temperatures refer to topside of the package, measured on the package body surface.

SOT-563 Dimension



The diagram shows three views of the SOT-563 package: a top view with dimensions L, E1, E, D, e, b, and θ ; a side view with dimensions A1 and A; and a bottom view with dimension c. The top view shows a rectangular package with six pins (three on each long side) and a lead angle θ . The side view shows the thickness of the package (A) and the lead height (A1). The bottom view shows the lead thickness (c).

Marking:



The marking diagram shows a top-down view of the package with pins numbered 1 to 6. Pin 1 is at the bottom left, pin 2 is at the bottom center, pin 3 is at the bottom right, pin 4 is at the top right, pin 5 is at the top center, and pin 6 is at the top left. The marking 'A3' is located in the center, with 'XX' to its right. A 'Product Code' is indicated by an arrow pointing to the left side of the package.

Date Code: Year+Month
 Year: 7→2017, 8→2018
 Month: 1→1, 2→2, . . .
 9→9, A→10, B→11, C→12

Style:
 Pin 1. Source1 (S1)
 Pin 2. Gate1 (G1)
 Pin 3. Drain2 (D2)
 Pin 4. Source2 (S2)
 Pin 5. Gate2 (G2)
 Pin 6. Drain1 (D1)

**6-Lead SOT-563 Plastic
 Surface Mounted Package
 CYStek Package Code: C6**

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.021	0.024	0.525	0.600	b	0.007	0.011	0.170	0.270
A1	0.000	0.002	0.000	0.050	E1	0.043	0.051	1.100	1.300
e	0.018	0.022	0.450	0.550	E	0.059	0.067	1.500	1.700
c	0.004	0.006	0.090	0.160	L	0.004	0.012	0.100	0.300
D	0.059	0.067	1.500	1.700	θ	7° REF		7° 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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