P-Channel Enhancement Mode MOSFET

MTD5D0P03J3

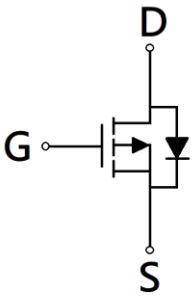
Features

- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

BV_{DSS}	-30V
I_D@V_{GS}=-10V, T_C=25°C	-56A
I_D@V_{GS}=-10V, T_A=25°C	-19A
$R_{DS(ON)}$ Typ.@ V_{GS}=-10V, I_D=-15A	4.2mΩ
$R_{DS(ON)}$ Typ.@ V_{GS}=-6V, I_D=-10A	6mΩ

Equivalent Circuit

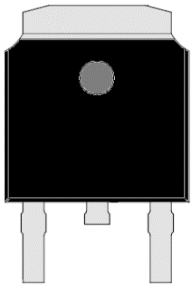
MTD5D0P03J3



G : Gate S : Source D : Drain

Outline

TO-252



G D S

Ordering Information

Device	Package	Shipping
MTD5D0P03J3-0-T3-G	TO-252 (Pb-free lead plating and halogen-free package)	2500 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 (T_A=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±25	
Continuous Drain Current @ V_{GS}=-10V, T_C=25°C (silicon limit)	*a	I_D	-98	A
Continuous Drain Current @ V_{GS}=-10V, T_C=25°C (package limit)	*a		-56	
Continuous Drain Current @ V_{GS}=-10V, T_C=100°C	*a		-56	
Continuous Drain Current @ V_{GS}=-10V, T_A=25°C	*b		-19	
Continuous Drain Current @ V_{GS}=-10V, T_A=70°C	*b		-15	
Pulsed Drain Current	*c	I_{DM}	-224	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	-56	
Pulsed Body Diode Forward Current @ T_C=25°C	*a	I_{SM}	-224	
Avalanche Current @ L=0.1mH		I_{AS}	-50	
Avalanche Energy @ L=0.5mH		E_{AS}	156	mJ
Total Power Dissipation	T_C=25°C *a	P_D	96	W
	T_C=100°C *a		38	
	T_A=25°C *b		3.6	
	T_A=70°C *b		2.3	
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		$R_{\theta JC}$	1.3	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	35	

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.

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
$V_{GS(th)}$	-1.5	-	-3		V_{DS}=V_{GS}, I_D=-250μA
G_{FS}	-	42	-	S	V_{DS}=-5V, I_D=-20A
I_{GSS}	-	-	±100	nA	V_{GS}=±25V, V_{DS}=0V
I_{DSS}	-	-	-1	μA	V_{DS}=-24V, V_{GS}=0V
$R_{DS(ON)}$	-	4.2	5.5	mΩ	V_{GS}=-10V, I_D=-15A
	-	6	12		V_{GS}=-6V, I_D=-10A
Dynamic					
Ciss	-	5300	-	pF	V_{DS}=-15V, V_{GS}=0V, f=1MHz
Coss	-	900	-		
Crss	-	450	-		
Rg	-	3	-	Ω	f=1MHz
Qg *1, 2	-	86	-	nC	V_{DS}=-15V, I_D=-15A, V_{GS}=-10V
Qgs *1, 2	-	21	-		
Qgd *1, 2	-	20	-		
$t_{d(ON)}$ *1, 2	-	28	-	ns	V_{DS}=-15V, I_D=-15A, V_{GS}=-10V, R_{GS}=1Ω
tr *1, 2	-	24	-		
$t_{d(OFF)}$ *1, 2	-	84	-		
t_f *1, 2	-	27	-		
Source-Drain Diode					
V_{SD} *1	-	-0.8	-1.2	V	I_S=-15A, V_{GS}=0V
trr	-	28	-	ns	I_F=-15A, dI_F/dt=100A/μs
Qrr	-	20	-	nC	

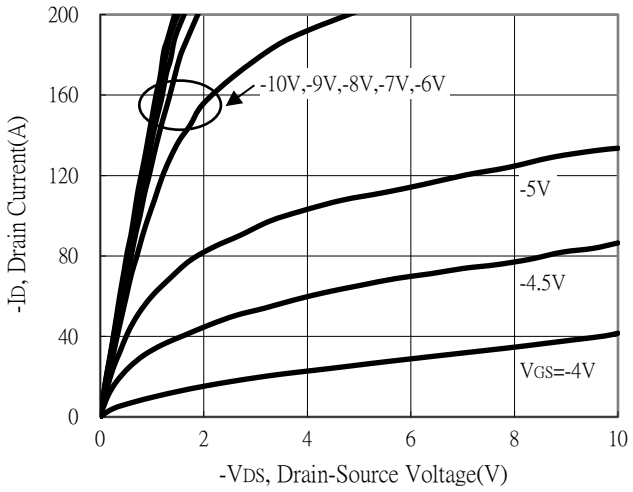
Note:

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

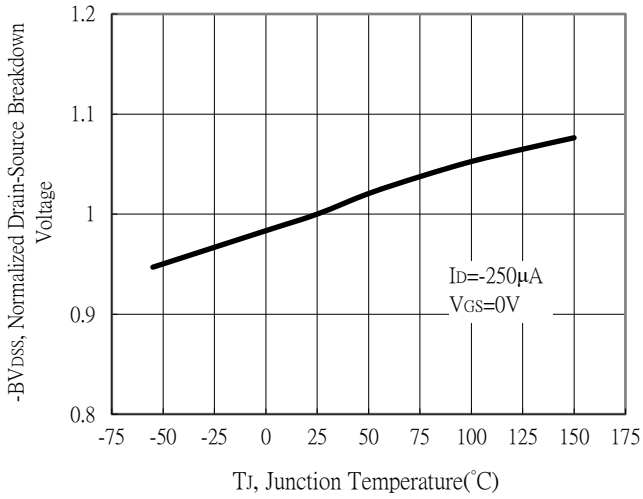
*2. Independent of operating temperature

Typical Characteristics

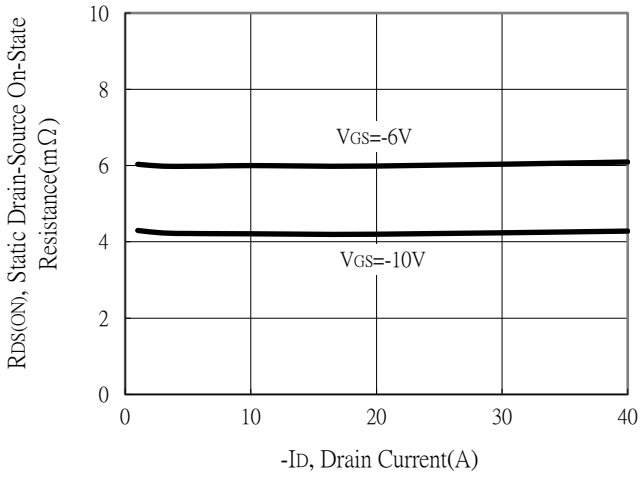
Typical Output Characteristics



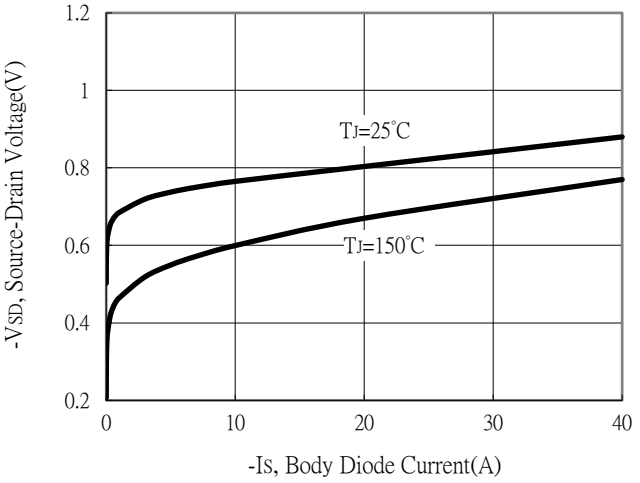
Breakdown Voltage vs Ambient Temperature



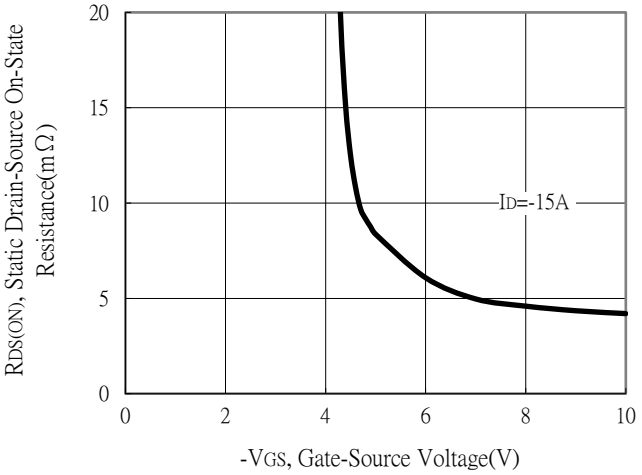
Static Drain-Source On-State resistance vs Drain Current



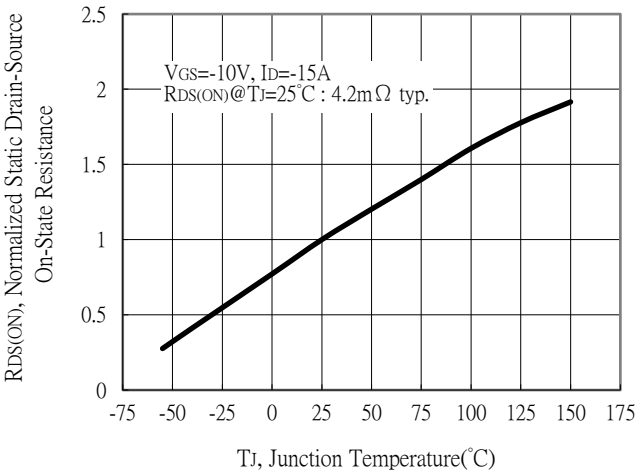
Body Diode Current vs Source-Drain Voltage



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

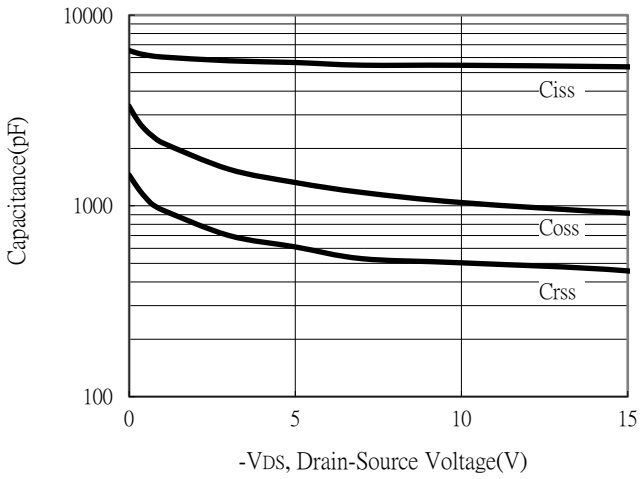


Drain-Source On-State Resistance vs Junction Temperature

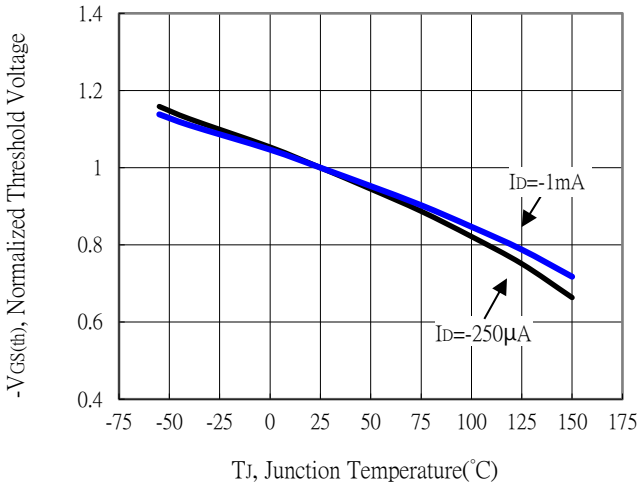


Typical Characteristics (Cont.)

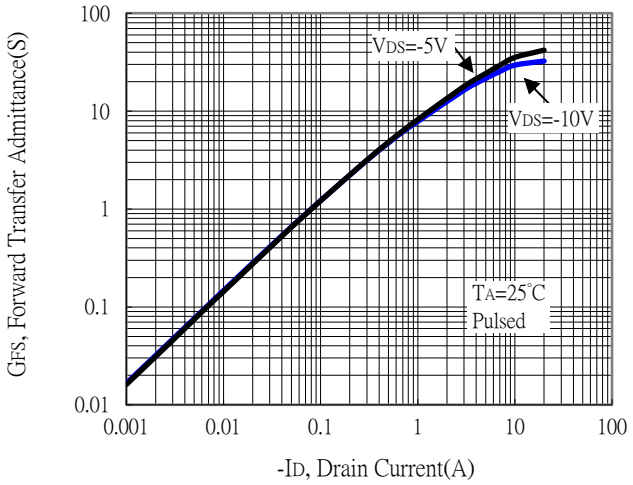
Capacitance vs Drain-to-Source Voltage



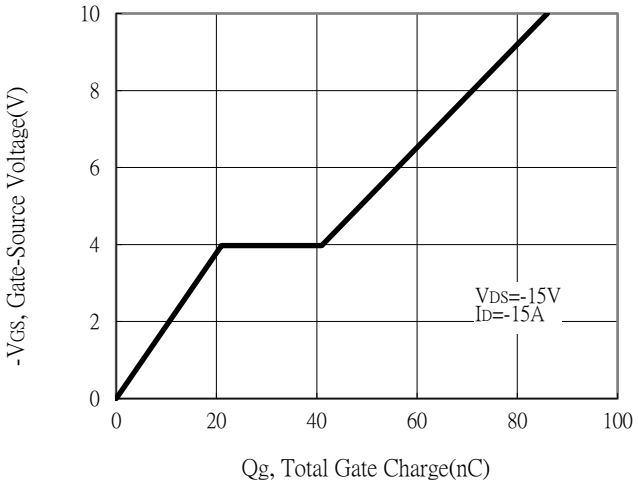
Threshold Voltage vs Junction Temperature



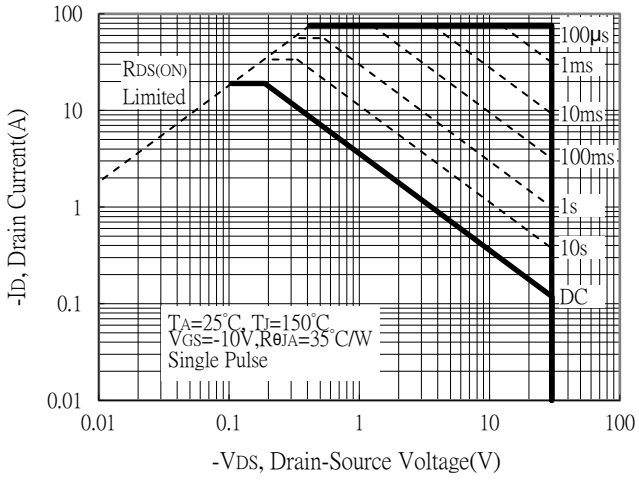
Forward Transfer Admittance vs Drain Current



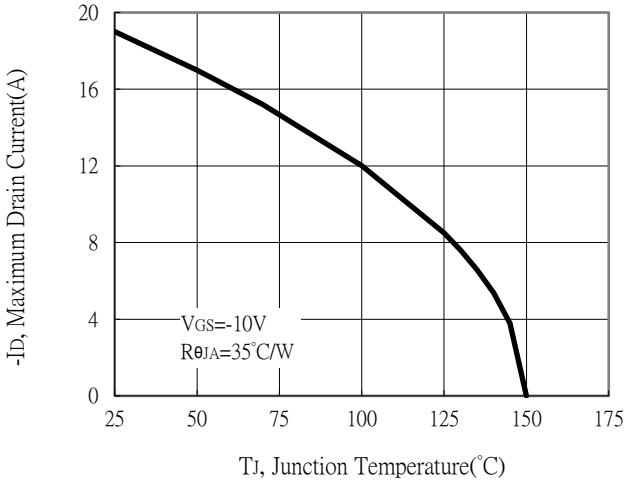
Gate Charge Characteristics



Maximum Safe Operating Area

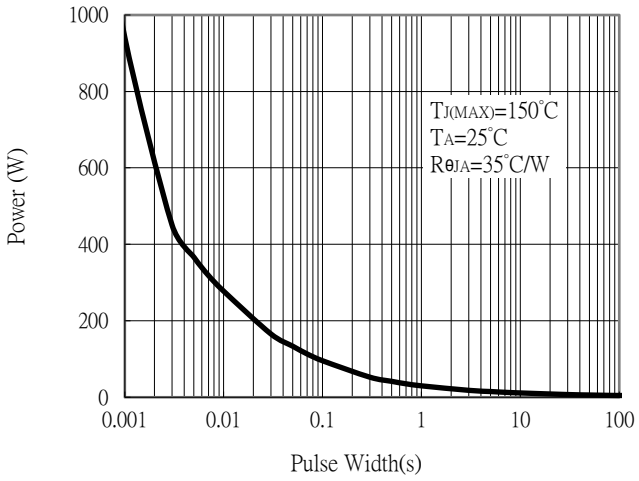


Maximum Drain Current vs Junction Temperature

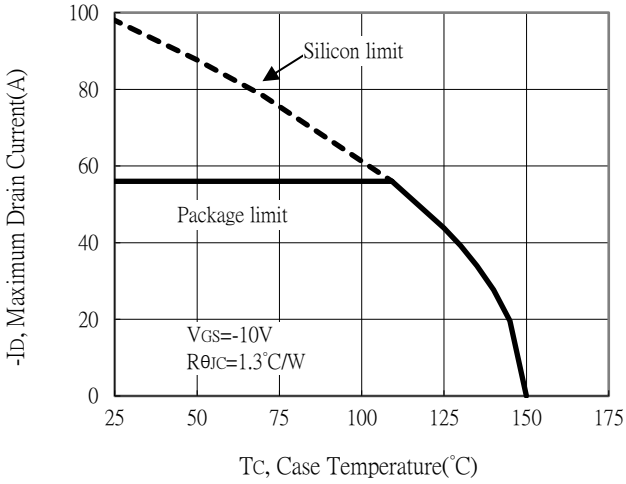


Typical Characteristics (Cont.)

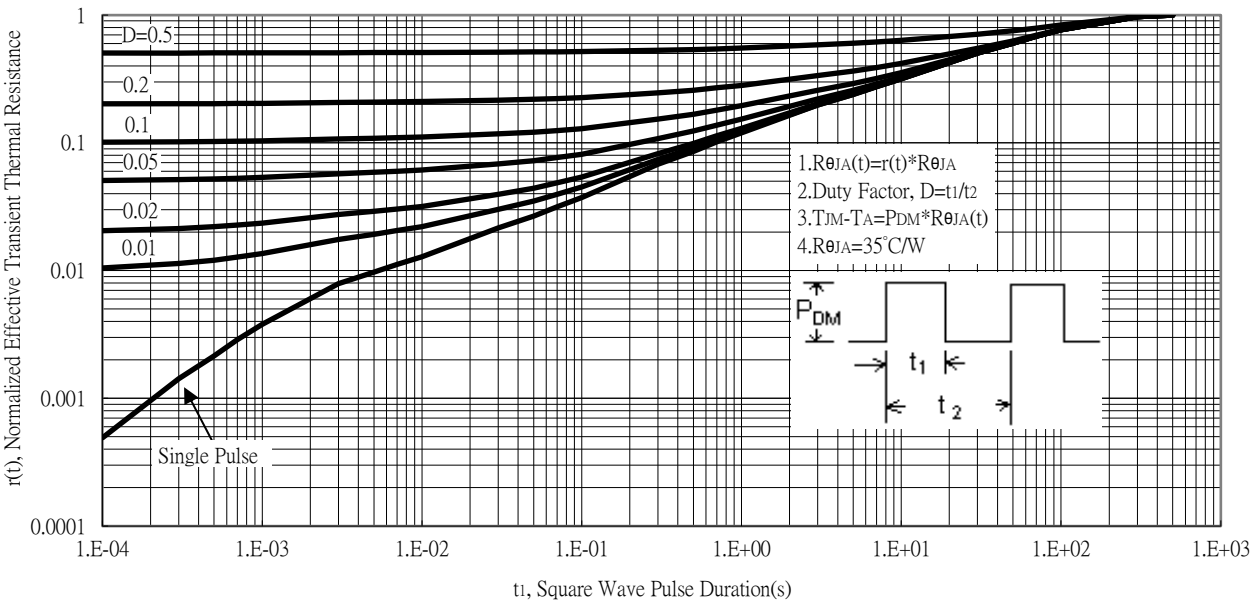
Single Pulse Power Rating, Junction to Ambient



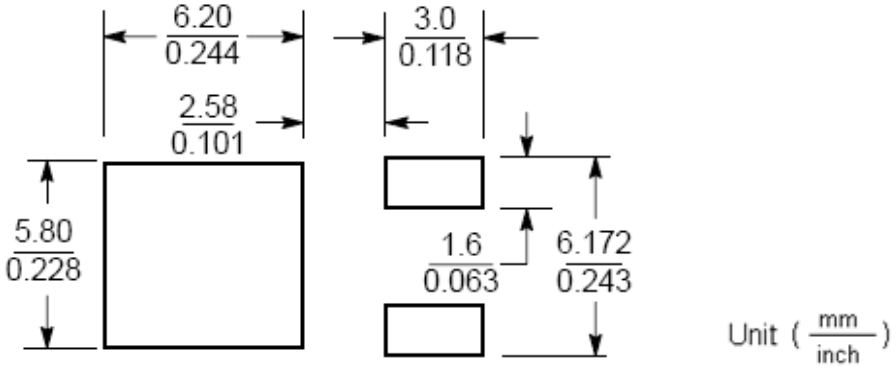
Maximum Drain Current vs Case Temperature



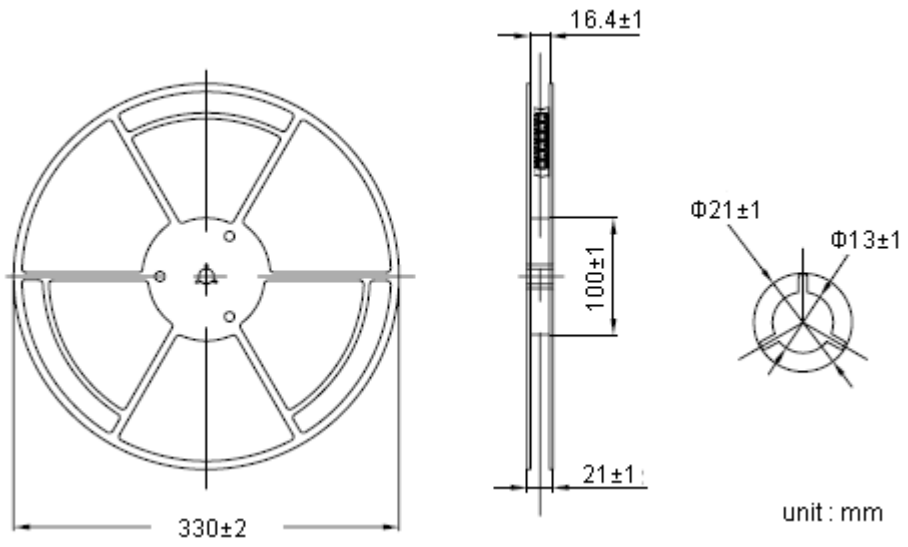
Transient Thermal Response Curves



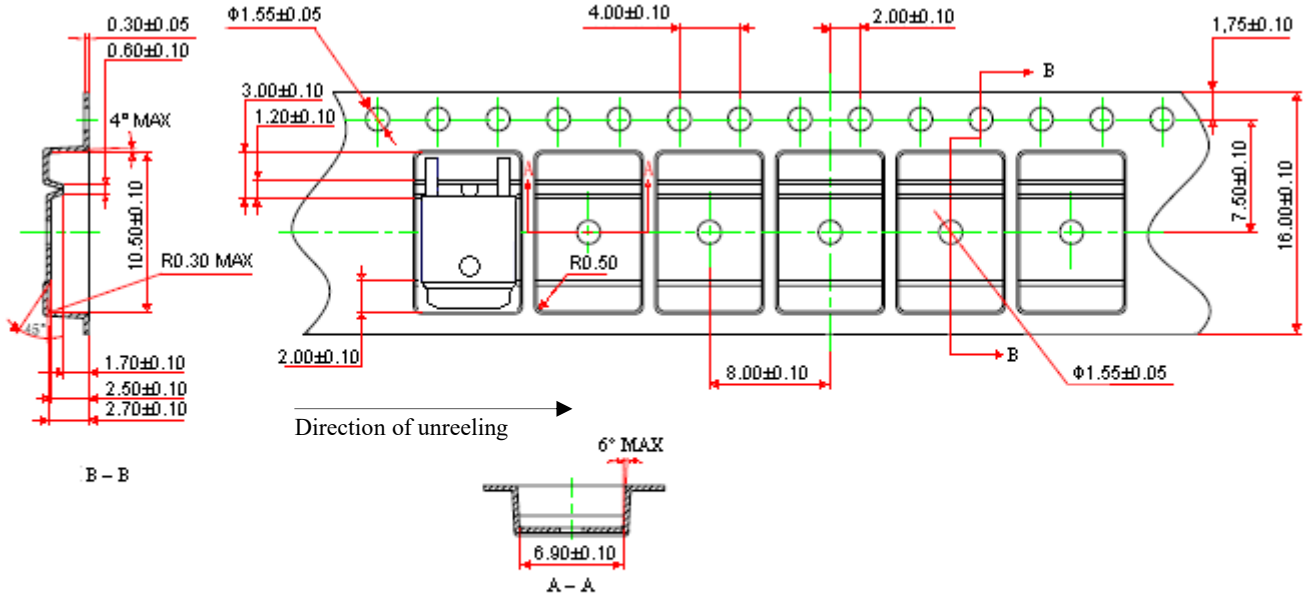
Recommended soldering footprint



Reel Dimension



Carrier Tape Dimension

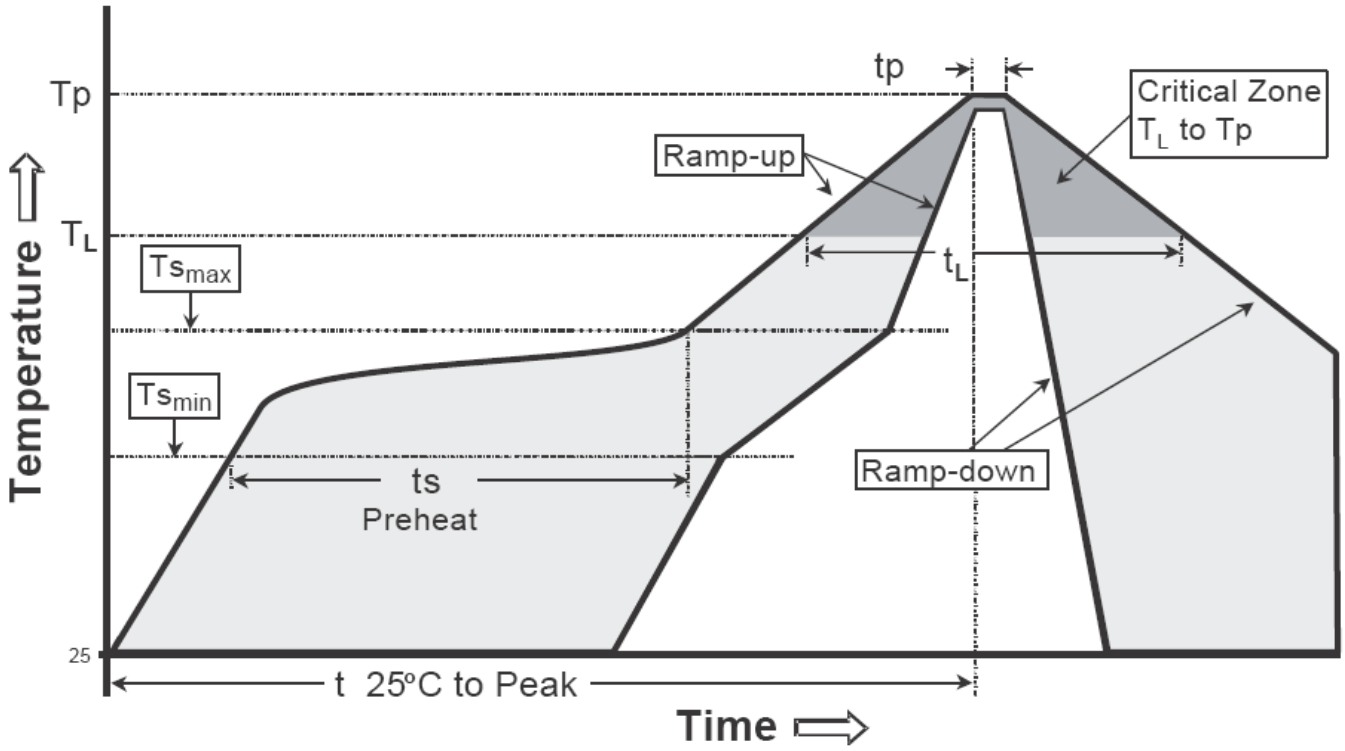


Notes:
1. 10 sprocket hole pitch cumulative tolerance ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: conductive black polystyrene, antistatic coated : 10^{5} Ω/□~ 10^{11} Ω/□ unit : mm

Recommended wave soldering condition

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

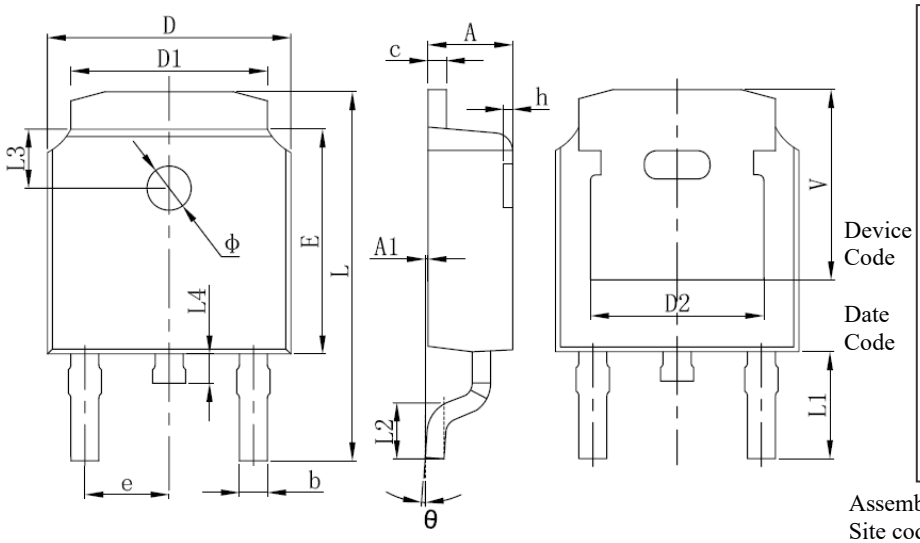
Recommended temperature profile for IR reflow



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(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 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.

TO-252 Dimension (C forming)



3-Lead TO-252 Plastic Surface Mount Package
CYS Package Code: J3

Style: Pin 1.Gate 2.Drain 3.Source
4.Drain

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

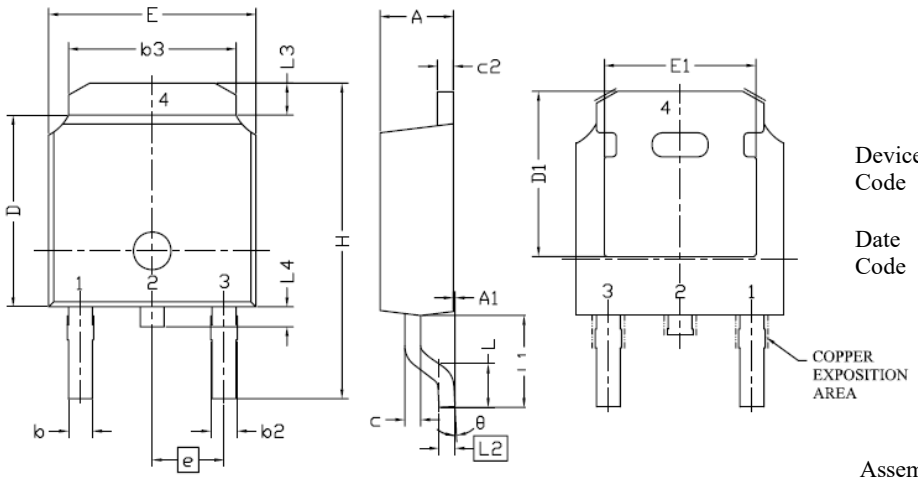
DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.087	0.094	2.200	2.400	L	0.382	0.406	9.712	10.312
A1	0.000	0.005	0.000	0.127	L1	0.114	REF	2.900	REF
b	0.025	0.030	0.635	0.770	L2	0.055	0.067	1.400	1.700
c	0.018	0.023	0.460	0.580	L3	0.063	REF	1.600	REF
D	0.256	0.264	6.500	6.700	L4	0.024	0.039	0.600	1.000
D1	0.201	0.215	5.100	5.460	Φ	0.043	0.051	1.100	1.300
D2	0.190	REF	4.830	REF	θ	0°	8°	0°	8°
E	0.236	0.244	6.000	6.200	h	0.000	0.012	0.000	0.300
e	0.086	0.094	2.186	2.386	V	0.207	REF	5.250	REF

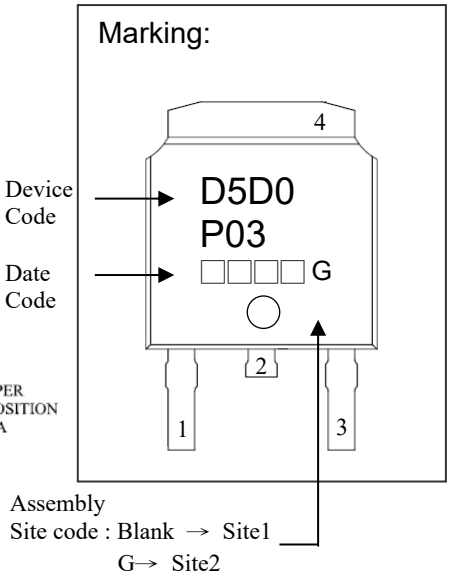
Notes: 1.Controlling dimension: millimeters.
2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead : Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

TO-252 Dimension (G forming)





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Sep→J, Oct→K, Nov→L, Dec→M
3rd and 4th codes : production serial number, 01~99

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
E	0.251	0.265	6.400	6.731	b3	0.205	0.215	5.210	5.460
L	0.055	0.070	1.400	1.770	e	0.090 BSC		2.286 BSC	
L1	0.107 REF		2.743 REF		A	0.087	0.093	2.200	2.380
L2	0.020 BSC		0.508 BSC		A1	0.000	0.005	0.000	0.127
L3	0.035	0.050	0.890	1.270	c	0.018	0.024	0.460	0.600
L4	0.025	0.039	0.640	1.010	c2	0.018	0.022	0.460	0.580
D	0.236	0.245	6.000	6.223	D1	0.205	-	5.210	-
H	0.370	0.409	9.400	10.400	E1	0.173	-	4.400	-
b	0.025	0.034	0.640	0.880	θ	0°	10°	0°	10°
b2	0.030	0.044	0.770	1.140					

Notes: 1.Controlling dimension: millimeters.
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