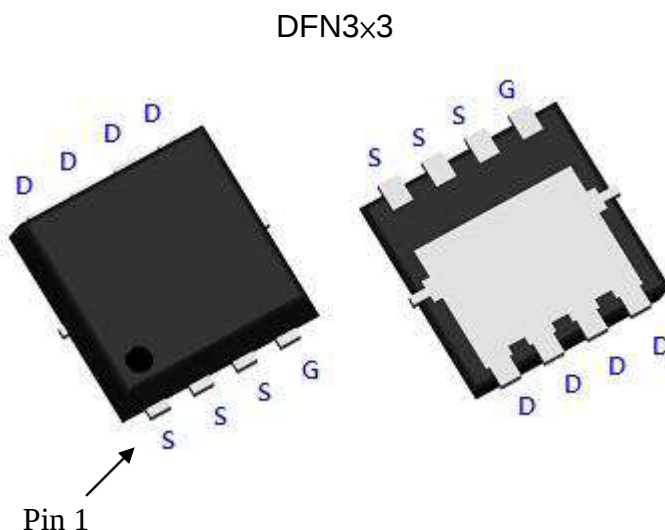


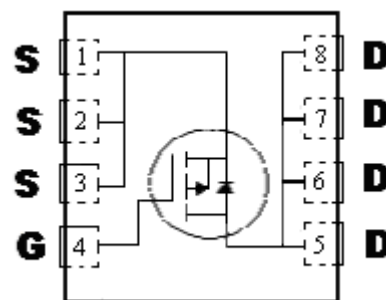
P-Channel Enhancement Mode Power MOSFET

Features:

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



BV_{DSS}	-20V
$I_D @ T_C=25^{\circ}C, V_{GS}=-4.5V$	-89A
$I_D @ T_A=25^{\circ}C, V_{GS}=-4.5V$	-19A
$R_{DS(on)} @ V_{GS}=-4.5V, I_D=-20A$	3.9 m Ω (typ.)
$R_{DS(on)} @ V_{GS}=-3V, I_D=-20A$	5.2 m Ω (typ.)
$R_{DS(on)} @ V_{GS}=-2.5V, I_D=-20A$	6.3 m Ω (typ.)



G : Gate S : Source D : Drain

Ordering Information

Device	Package	Shipping
KSPRA4D0P02	DFN3x3 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (Ta=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	-20	V
Gate-Source Voltage	V _{GS}	±10	
Continuous Drain Current @ T _C =25°C, V _{GS} =-4.5V	I _D	-89	A
Continuous Drain Current @ T _C =70°C, V _{GS} =-4.5V		-71	
Continuous Drain Current @ T _A =25°C, V _{GS} =-4.5V		-19	
Continuous Drain Current @ T _A =70°C, V _{GS} =-4.5V		-15	
Pulsed Drain Current	I _{DM}	-200 *1	
Avalanche Current @ L=0.1mH	I _{AS}	-50	mJ
Avalanche Energy @ L=1mH, I _D =-18A, V _{DD} =-15V	E _{AS}	162 *4	
Repetitive Avalanche Energy @ L=0.05mH	E _{AR}	6 *2	
Total Power Dissipation	P _D	T _C =25°C 62.5	W
		T _C =100°C 25	
		T _A =25°C 2.5 *3	
		T _A =70°C 1.6 *3	
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}	2	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{θJA}	50 *3	

- 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, t ≤ 10s ; 125°C/W when mounted on minimum copper pad.
4. 100% tested by conditions of L=0.1mH, I_{AS}=-10A, V_{GS}=-10V, V_{DD}=-15V

Electrical Characteristics (T_j=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)}	-0.4	-	-1.5		V _{DS} =V _{GS} , I _D =-250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±10V, V _{DS} =0V
I _{DSS}	-	-	-1	μA	V _{DS} =-16V, V _{GS} =0V
	-	-	-10		V _{DS} =-16V, V _{GS} =0V, T _j =125°C
R _{DS(ON)} *1	-	3.9	5.1	mΩ	V _{GS} =-4.5V, I _D =-20A
	-	5.2	7.8		V _{GS} =-3.0V, I _D =-20A
	-	6.3	9.5		V _{GS} =-2.5V, I _D =-20A
G _{FS} *1	-	32.6	-	S	V _{DS} =-5V, I _D =-3A

Electrical Characteristics(Cont.) (Tj=25°C, unless otherwise specified)

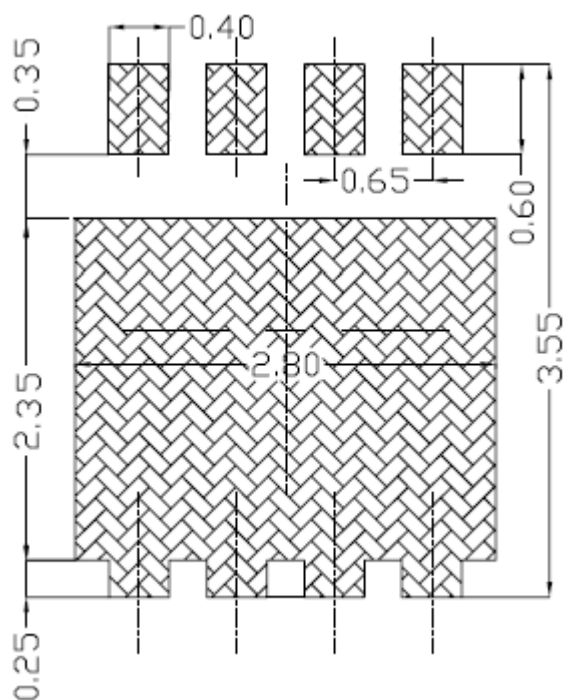
Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Dynamic					
Ciss	-	7514	-	pF	V _{DS} =-10V, V _{GS} =0V, f=1MHz
Coss	-	643	-		
Crss	-	417	-		
Qg *1, 2	-	84	110	nC	V _{DS} =-10V, I _D =-20A, V _{GS} =-4.5V
Qgs *1, 2	-	14.5	-		
Qgd *1, 2	-	25.1	-		
t _{d(ON)} *1, 2	-	33	-	ns	V _{DS} =-10V, I _D =-20A, V _{GS} =-4.5V R _G =6Ω
tr *1, 2	-	90.8	-		
t _{d(OFF)} *1, 2	-	317.8	-		
t _f *1, 2	-	158.4	-		
Rg	-	5.6	-	Ω	f=1MHz
Source-Drain Diode					
I _S *1	-	-	-73	A	
I _{SM} *3	-	-	-200		
V _{SD} *1	-	-0.7	-1	V	I _F =-1A, V _{GS} =0V
trr	-	96.8	-	ns	I _F =-20A, dI _F /dt=100A/μs
Qrr	-	202	-	nC	

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

*2.Independent of operating temperature

*3.Pulse width limited by maximum junction temperature.

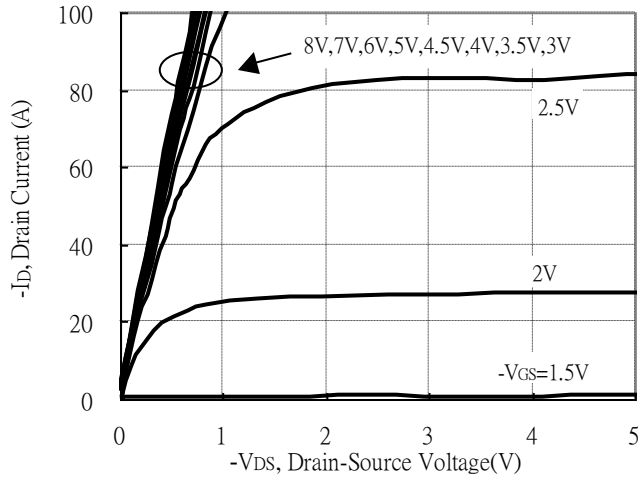
Recommended Soldering Footprint



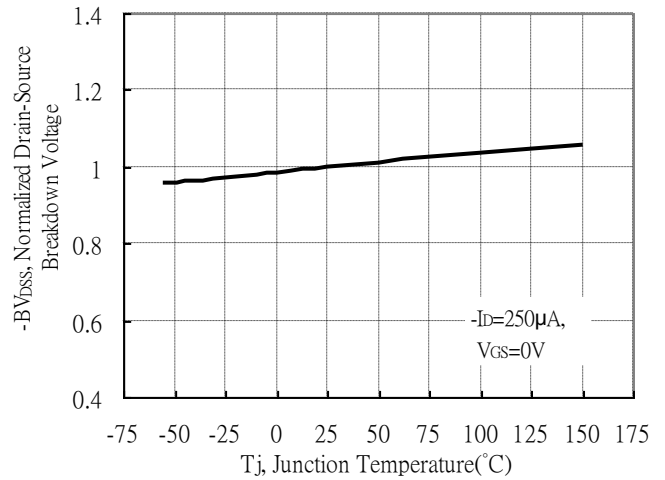
unit : mm

Typical Characteristics

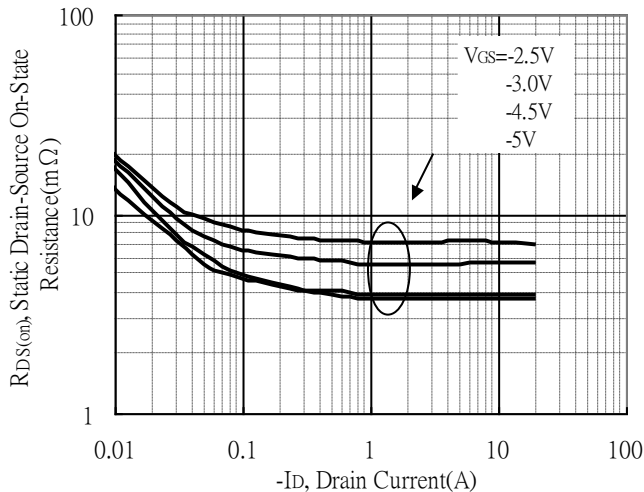
Typical Output Characteristics



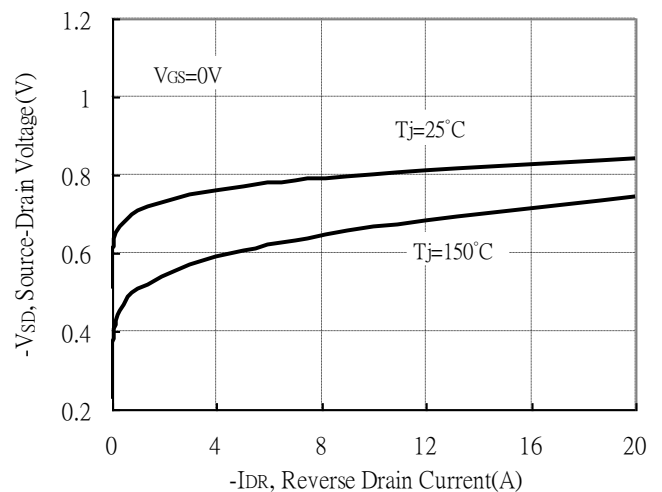
Breakdown Voltage vs Junction Temperature



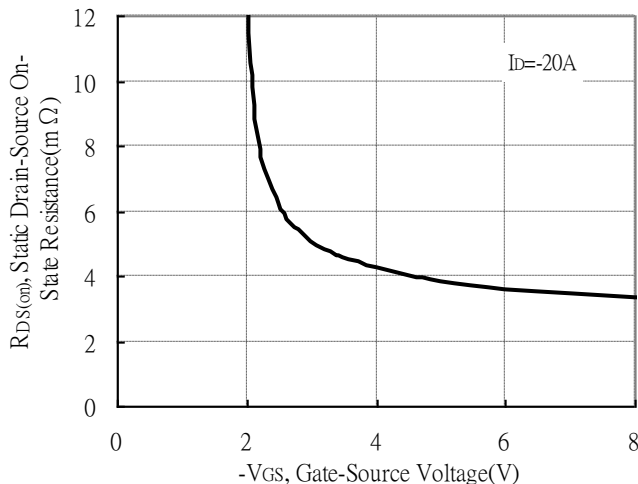
Static Drain-Source On-State resistance vs Drain Current



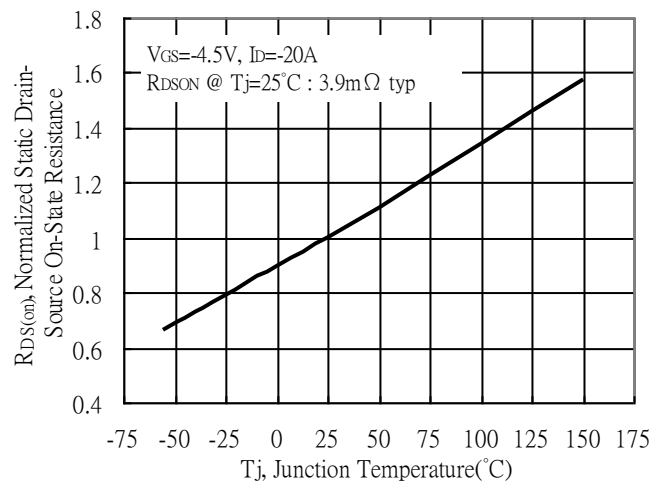
Reverse Drain Current vs Source-Drain Voltage



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

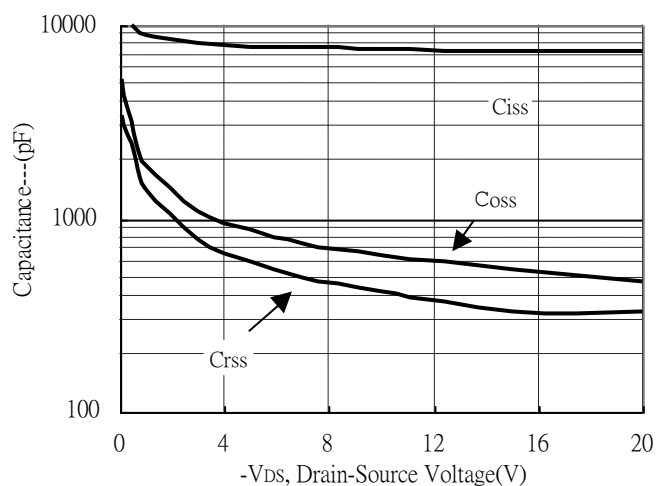


Drain-Source On-State Resistance vs Junction Temperature

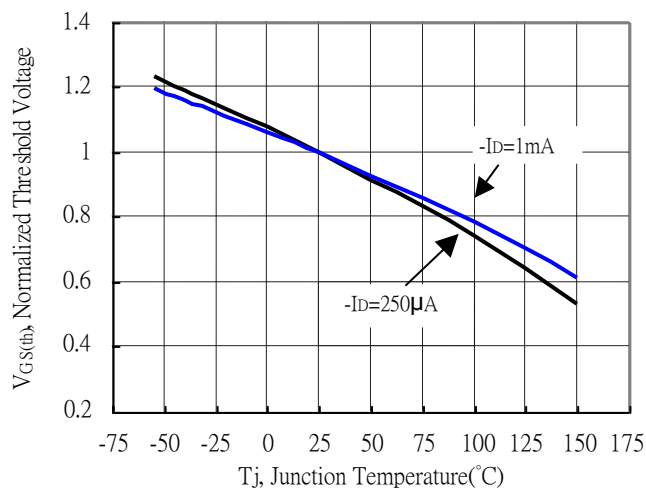


Typical Characteristics(Cont.)

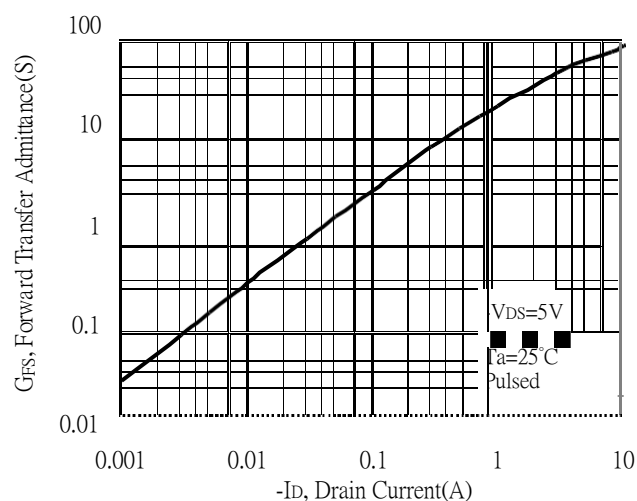
Capacitance vs Drain-to-Source Voltage



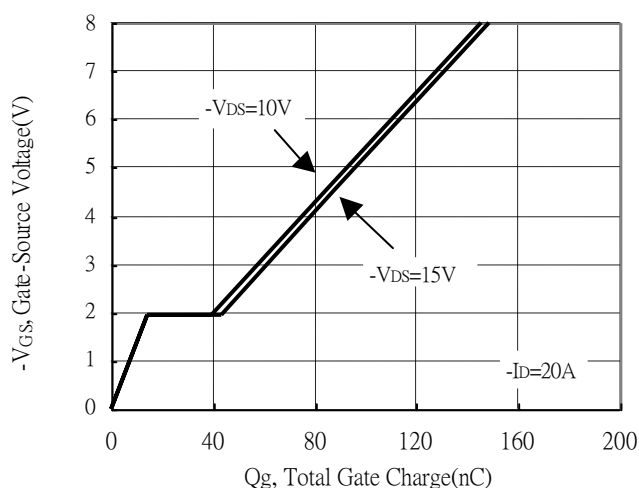
Threshold Voltage vs Junction Temperature



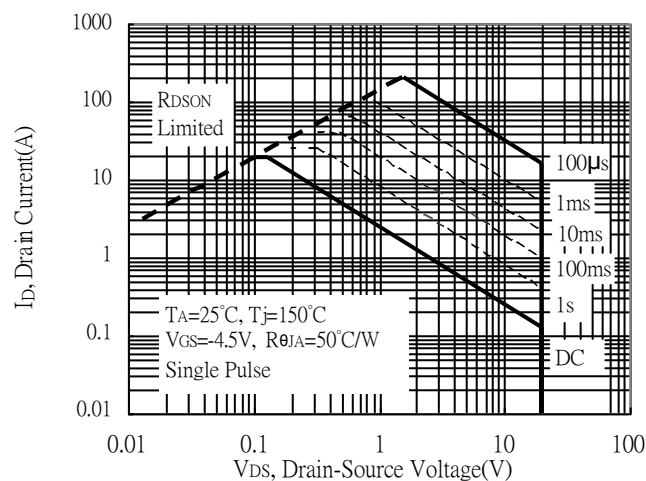
Forward Transfer Admittance vs Drain Current



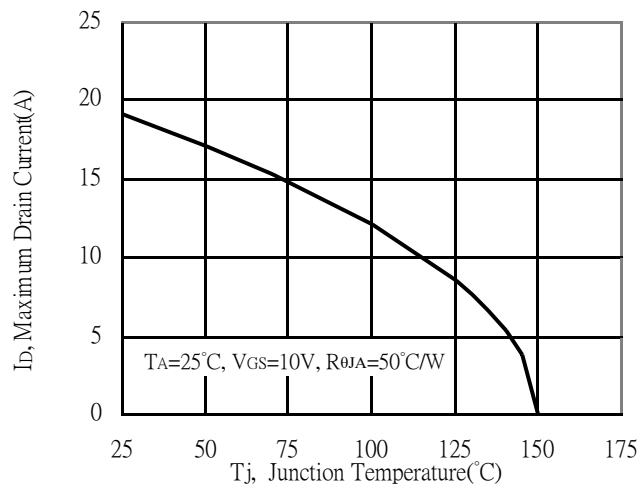
Gate Charge Characteristics



Maximum Safe Operating Area

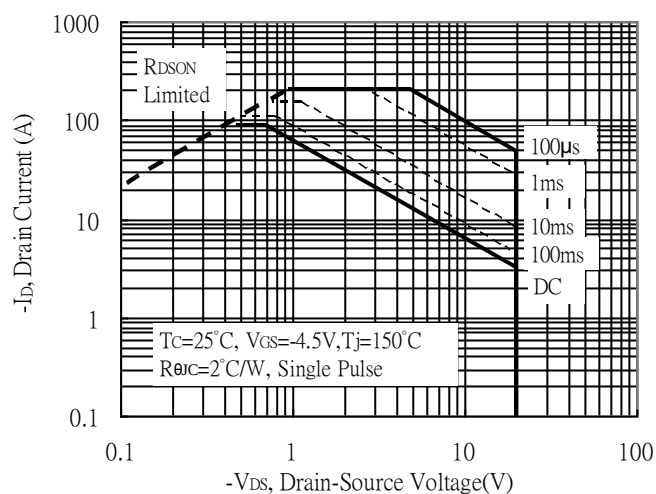


Maximum Drain Current vs Junction Temperature

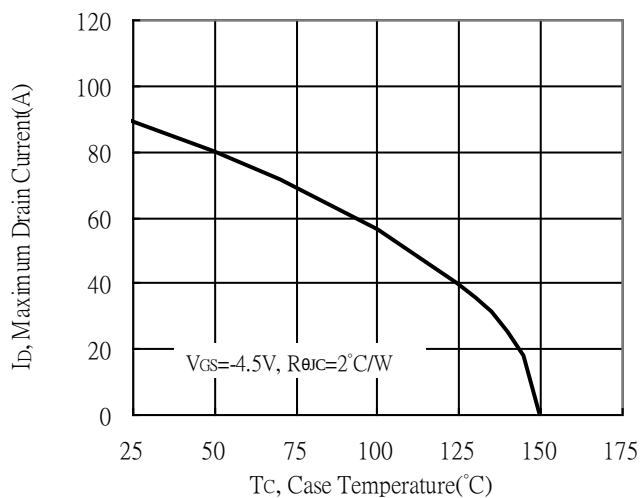


Typical Characteristics(Cont.)

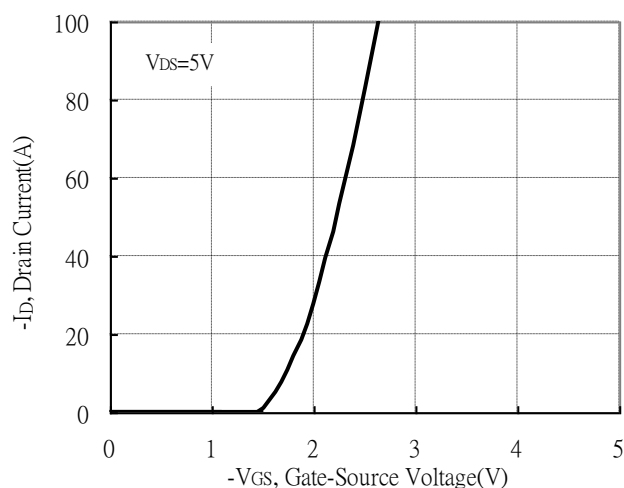
Maximum Safe Operating Area



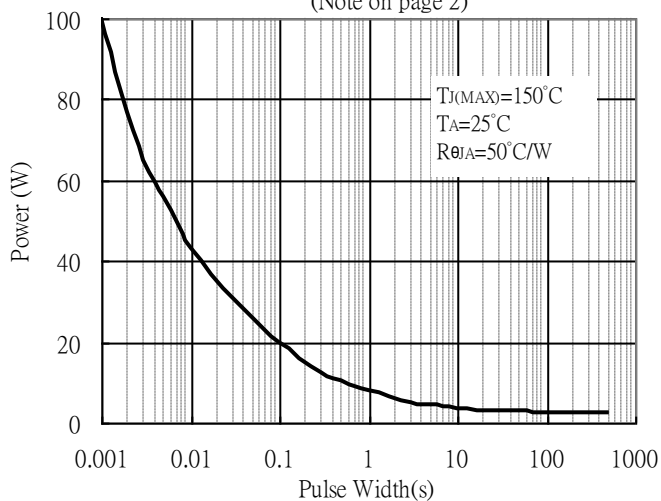
Maximum Drain Current vs Case Temperature



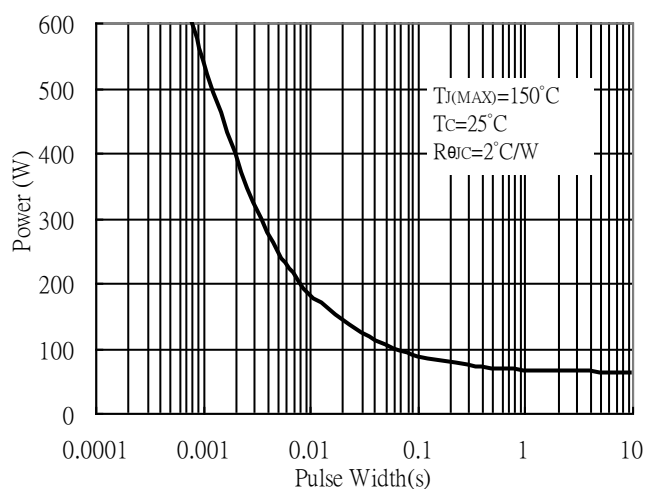
Typical Transfer Characteristics



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

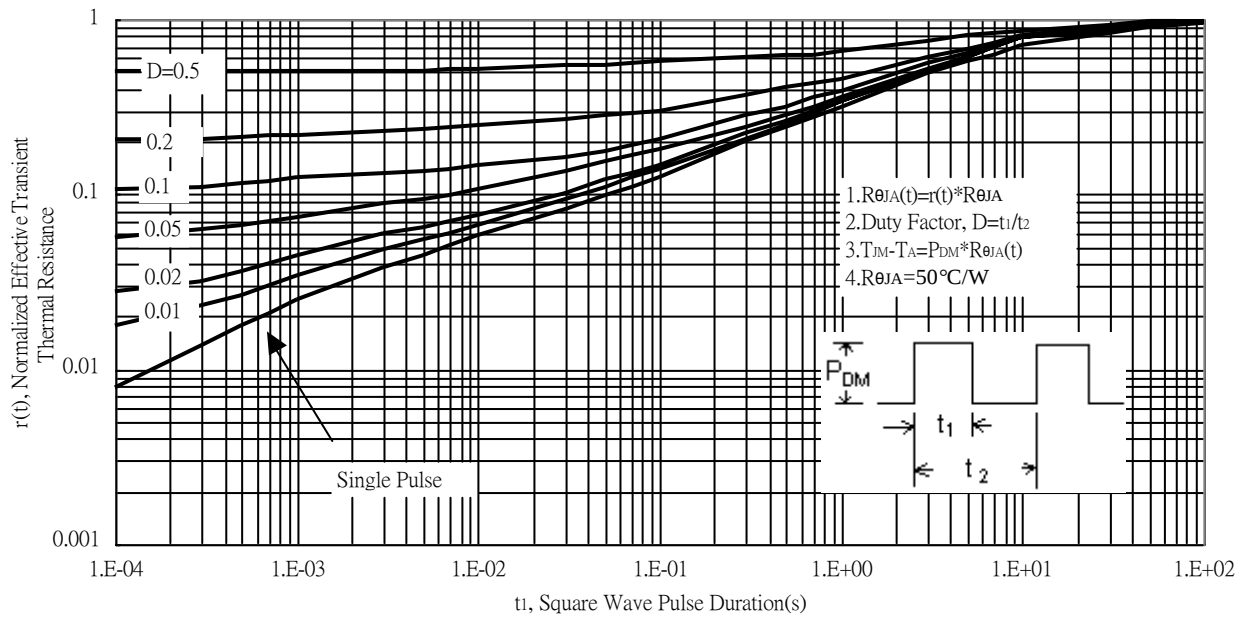


Single Pulse Maximum Power Dissipation

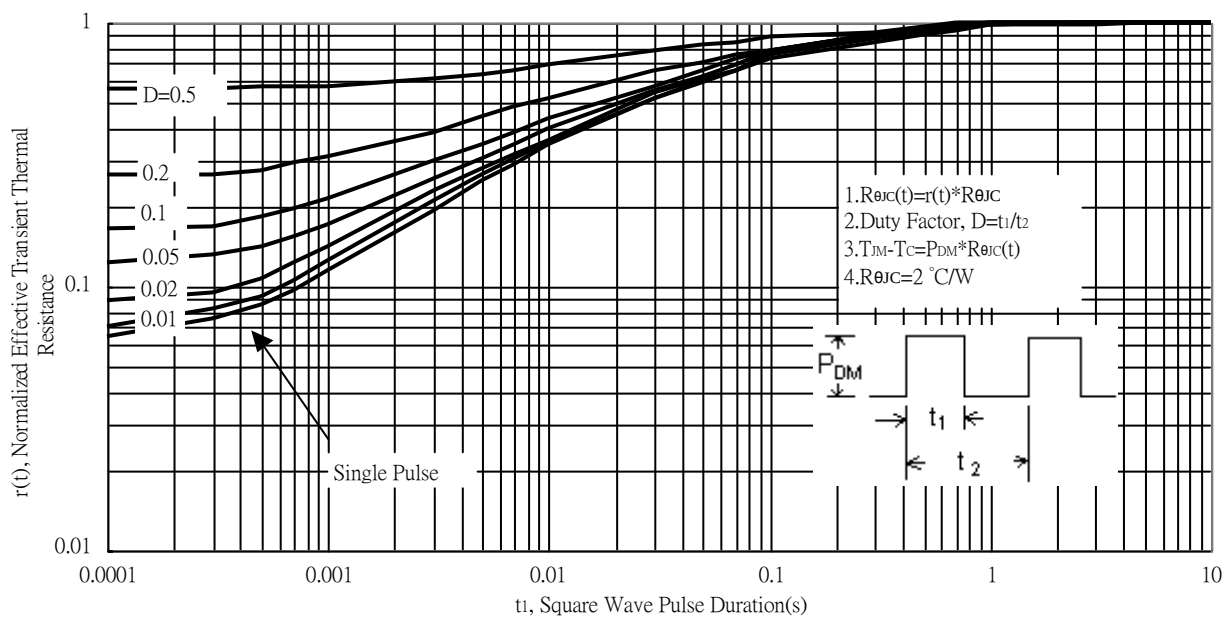


Typical Characteristics(Cont.)

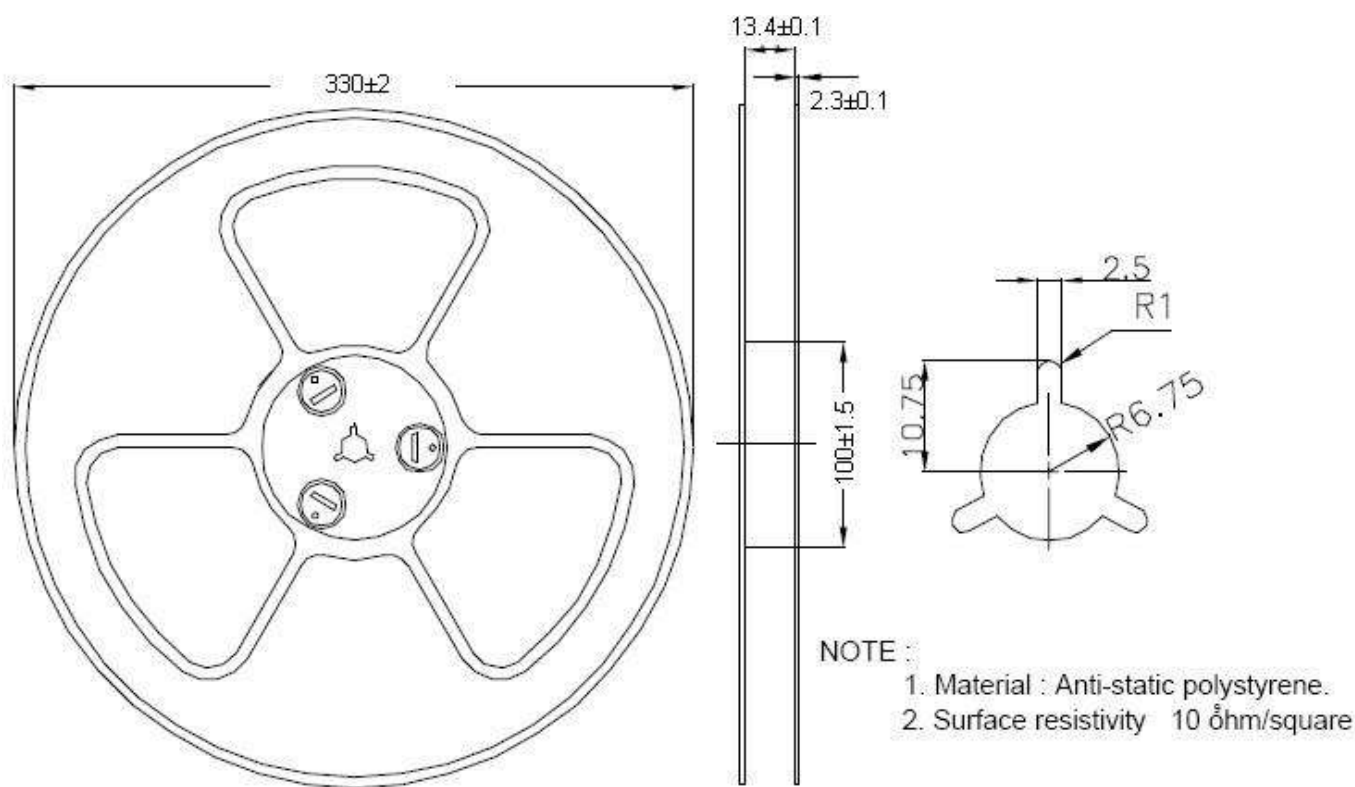
Transient Thermal Response Curves



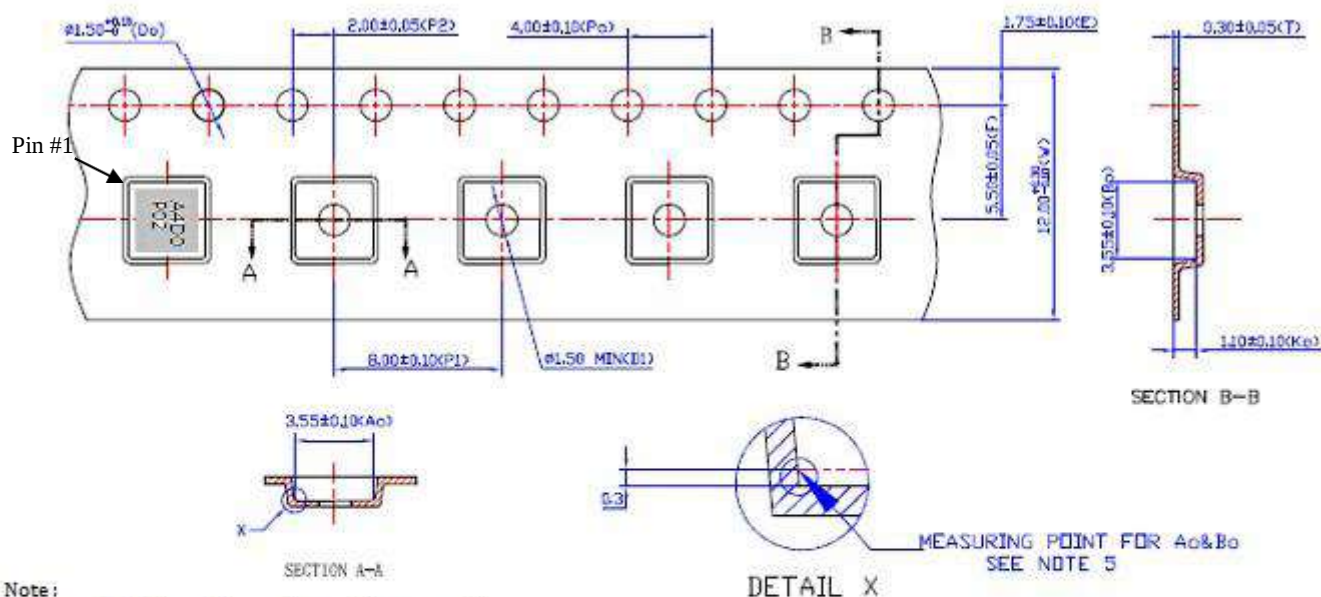
Transient Thermal Response Curves



Reel Dimension



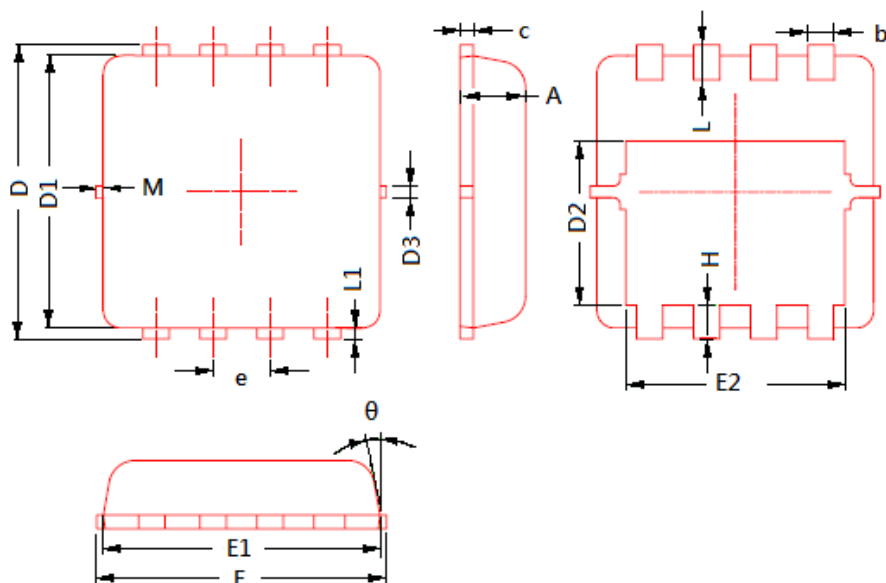
Carrier Tape Dimension



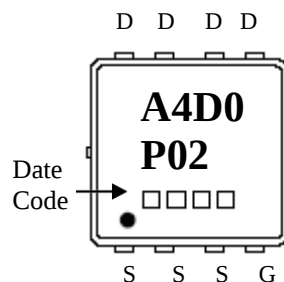
Note :

1. 10 sprocket hole pitch cumulative tolerance : ±0.2mm.
2. Camber : Reference to carrier tape inspection manual.
3. Material : black conductive polystyrene.
4. All dimensions are in millimeters(unless otherwise specified).
5. Ao and Bo measured on a plane 0.3mm above the bottom of the pocket.
6. Ko 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 the pocket, not pocket hole.
8. Surface resistivity : 1×10E4~1×10E11 ohms/sq

DFN3×3 Dimension



Marking:



8-Lead DFN3×3 Plastic Package

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.70	0.80	0.028	0.031	E1	3.00	3.20	0.118	0.126
b	0.25	0.35	0.010	0.014	E2	2.39	2.59	0.094	0.102
c	0.10	0.25	0.004	0.010	e	0.65 BSC		0.026 BSC	
D	3.25	3.45	0.128	0.136	H	0.30	0.50	0.012	0.020
D1	3.00	3.20	0.118	0.126	L	0.30	0.50	0.012	0.020
D2	1.78	1.98	0.070	0.078	L1	0.13 TYP		0.005 TYP	
D3	0.13 TYP		0.005 TYP		θ	-	12°	-	12°
E	3.20	3.40	0.126	0.134	M	-	0.15	-	0.006