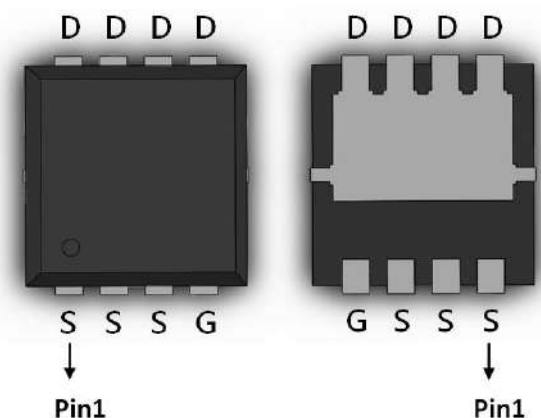


N-Channel Enhancement Mode Power MOSFET

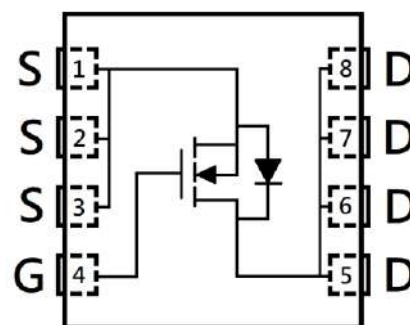
Outline

DFN3×3



Equivalent Circuit

KSPRA1D9N03



G : Gate S : Source D : Drain

Features

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

BV_{DSS}	30V
$I_D @ V_{GS}=10V, T_C=25^\circ C$	83A
$I_D @ V_{GS}=10V, T_A=25^\circ C$	16A
$R_{DS(ON) Typ.} @ V_{GS}=4.5V, I_D=20A$	$2.7m\Omega$
$R_{DS(ON) Typ.} @ V_{GS}=2.5V, I_D=20A$	$3.6m\Omega$

Ordering Information

Device	Package	Shipping
KSPRA1D9N03	DFN3×3 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V _{DS}	30	V
Gate-Source Voltage		V _{GS}	±12	
Continuous Drain Current @ V _{GS} =10V, T _C =25°C		I _D	83	A
Continuous Drain Current @ V _{GS} =10V, T _C =100°C			53	
Continuous Drain Current @ V _{GS} =10V, T _A =25°C			16	
Continuous Drain Current @ V _{GS} =10V, T _A =70°C			13	
Pulsed Drain Current		I _{DM}	332	
Continuous Body Diode Forward Current @ T _C =25°C		I _S	43	
Pulsed Body Diode Forward Current @ T _C =25°C		I _{SM}	172	
Avalanche Current @ L=0.1mH		I _{AS}	35	mJ
Avalanche Energy @ L=0.5mH		E _{AS}	100	
Total Power Dissipation	T _C =25°C	P _D	52	W
	T _C =100°C		21	
	T _A =25°C		1.9	
	T _A =70°C		1.2	
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 _{θJC}	2.4	°C/W
Thermal Resistance, Junction-to-ambient	R _{θJA}	67	

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_{θJA} 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_{DSM} is based on R_{θJA} 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)}	0.5	-	1.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	74	-	S	V _{DS} =5V, I _D =20A
I _{GSS}	-	-	±100	nA	V _{GS} =±12V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =24V, V _{GS} =0V
R _{DS(ON)}	-	2.7	4	mΩ	V _{GS} =4.5V, I _D =20A
	-	3.6	5.5		V _{GS} =2.5V, I _D =20A
Dynamic					
C _{iss}	-	4200	-	pF	V _{DS} =15V, V _{GS} =0V, f=1MHz
C _{oss}	-	370	-		
C _{rss}	-	300	-		
R _g	-	1.5	-	Ω	f=1MHz
Q _g *1, 2	-	55	-	nC	V _{DS} =15V, I _D =20A, V _{GS} =4.5V
Q _{gs} *1, 2	-	7.7	-		
Q _{gd} *1, 2	-	18	-		
t _{d(ON)} *1, 2	-	13	-	ns	V _{DS} =15V, I _D =20A, V _{GS} =4.5V, R _{GS} =3 Ω
t _r *1, 2	-	18	-		
t _{d(OFF)} *1, 2	-	125	-		
t _f *1, 2	-	13	-		
Source-Drain Diode					
V _{SD} *1	-	0.8	1.2	V	I _S =20A, V _{GS} =0V
t _{rr}	-	17	-	ns	I _F =20A, dI _F /dt=100A/μs
Q _{rr}	-	10.5	-	nC	

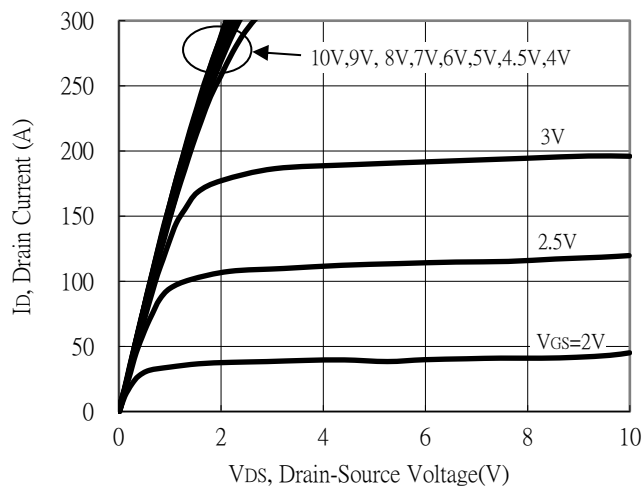
Note:

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

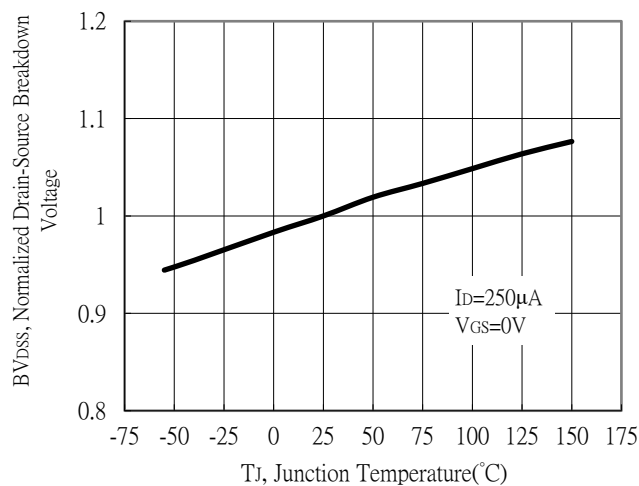
*2. Independent of operating temperature

Typical Characteristics

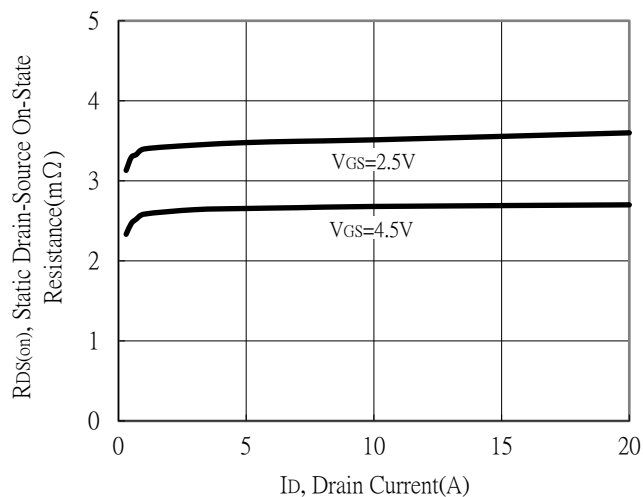
Typical Output Characteristics



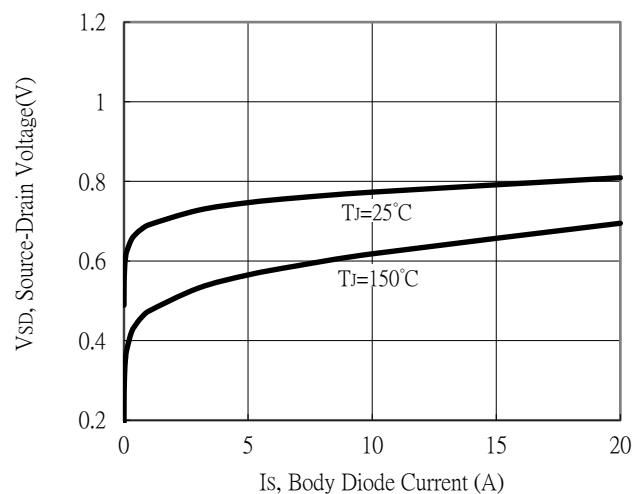
Breakdown Voltage vs Ambient Temperature



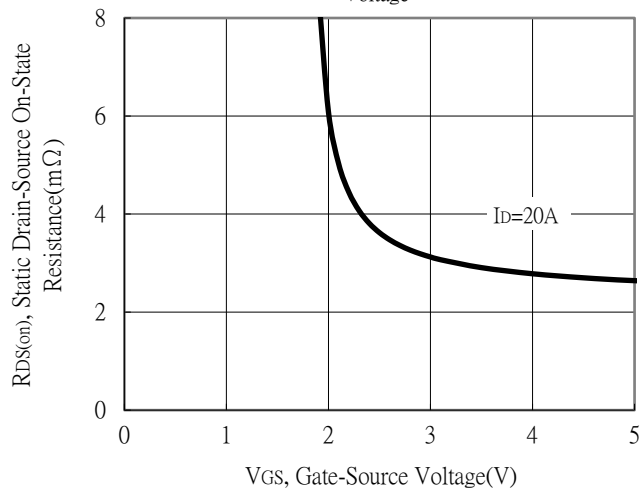
Static Drain-Source On-State resistance vs Drain Current



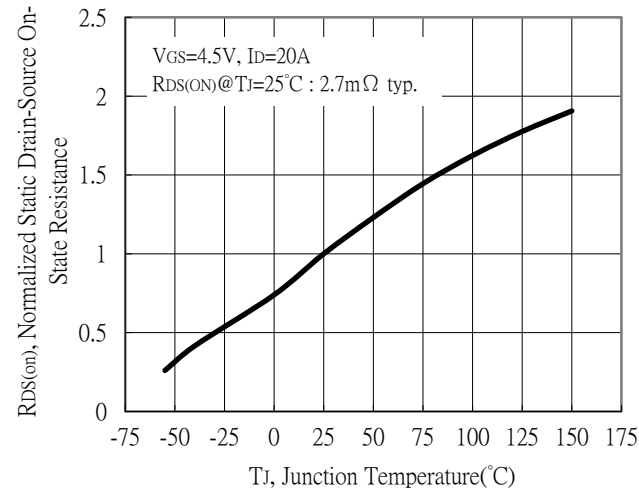
Body Diode Current vs Source-Drain Voltage



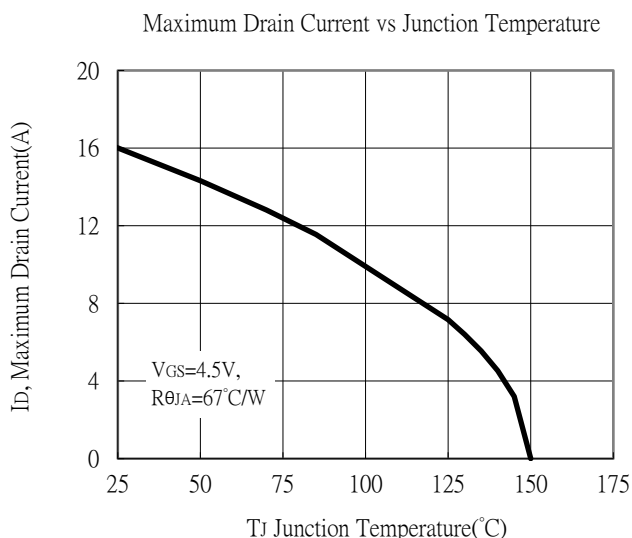
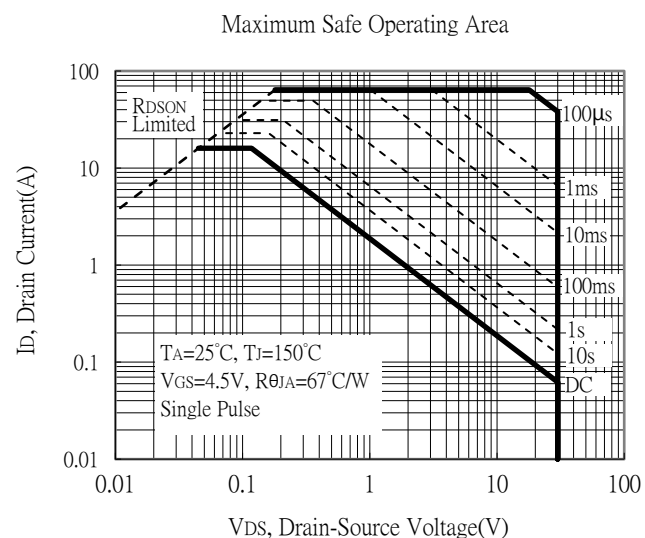
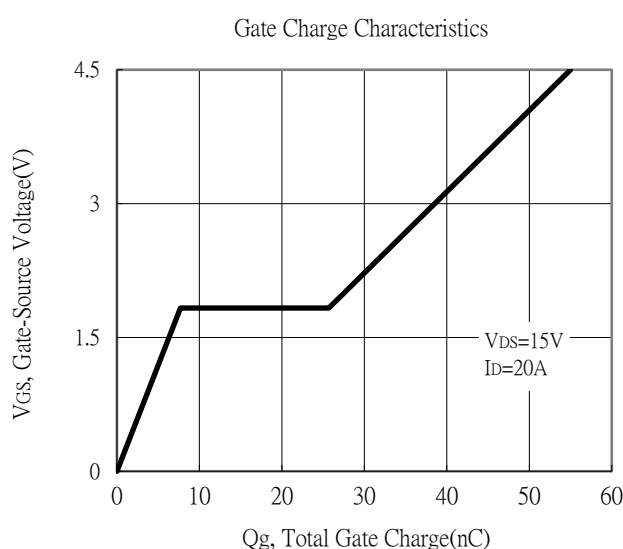
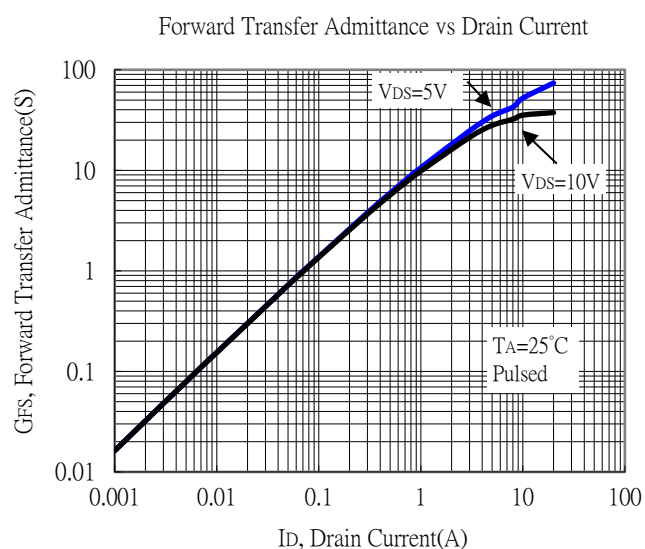
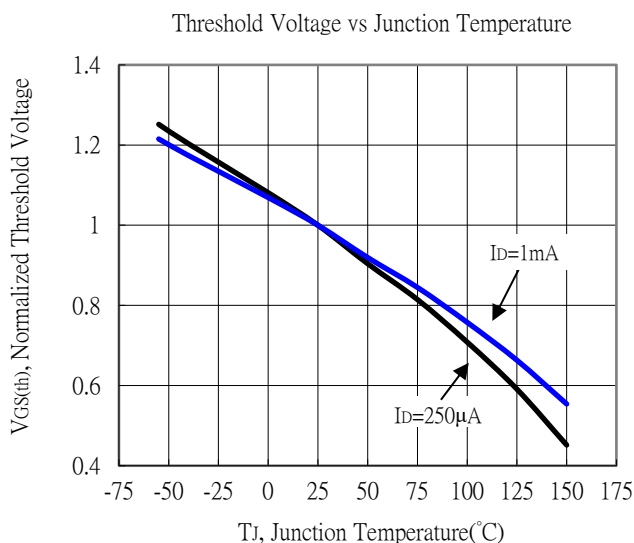
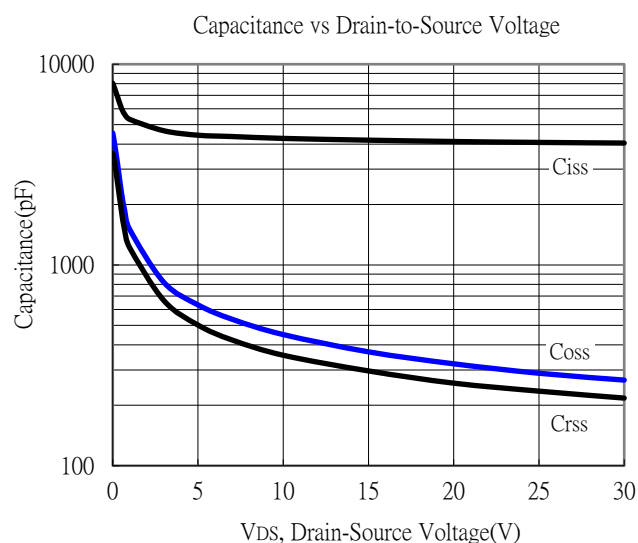
Static Drain-Source On-State Resistance vs Gate-Source Voltage



Drain-Source On-State Resistance vs Junction Temperature

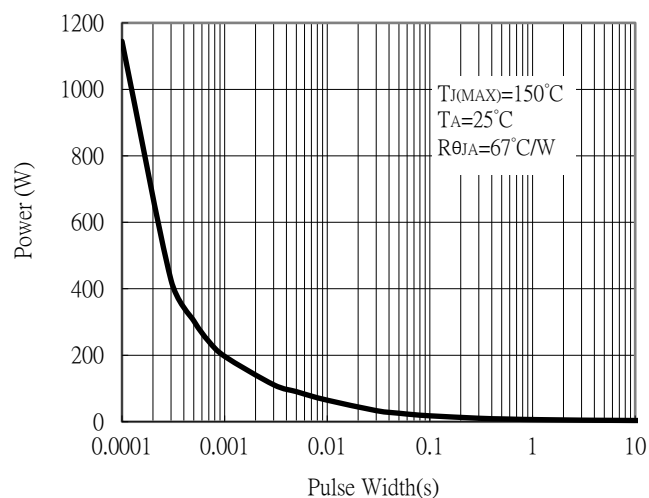


Typical Characteristics (Cont.)

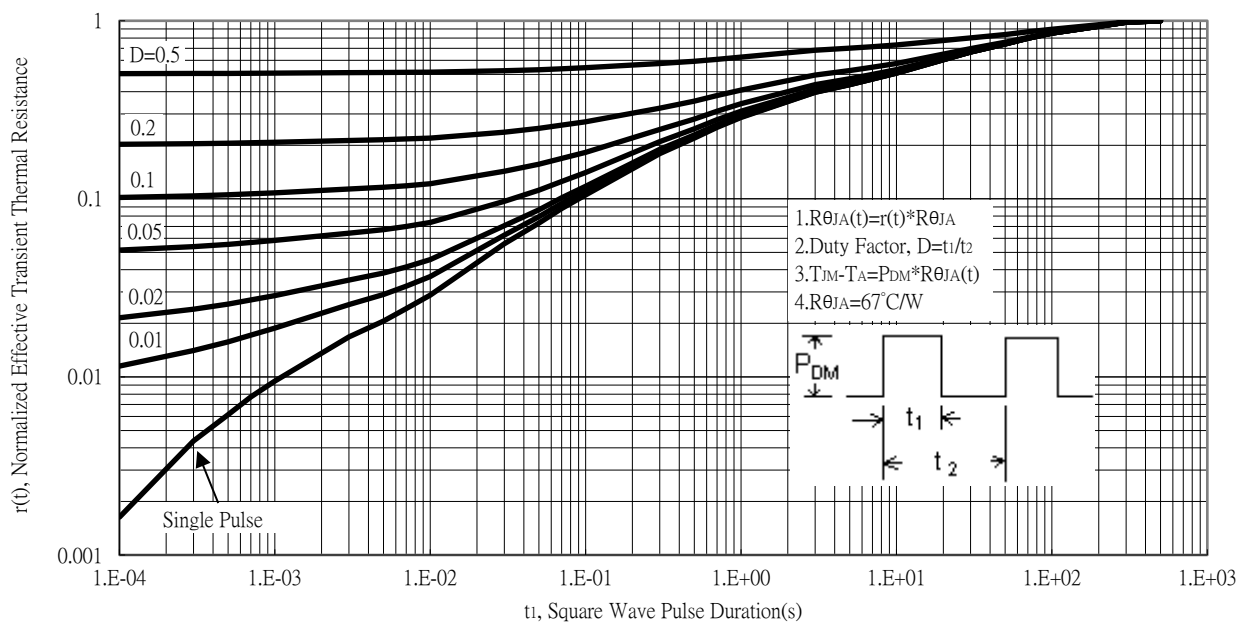


Typical Characteristics (Cont.)

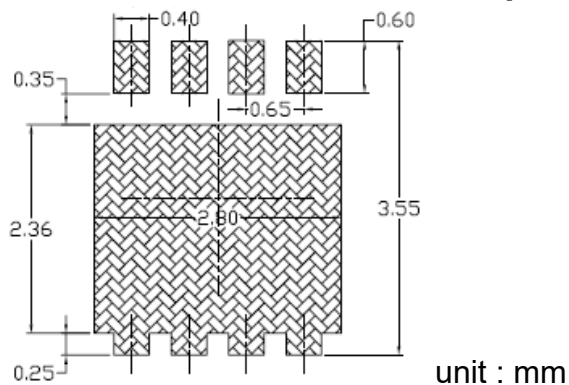
Single Pulse Power Rating, Junction to Ambient



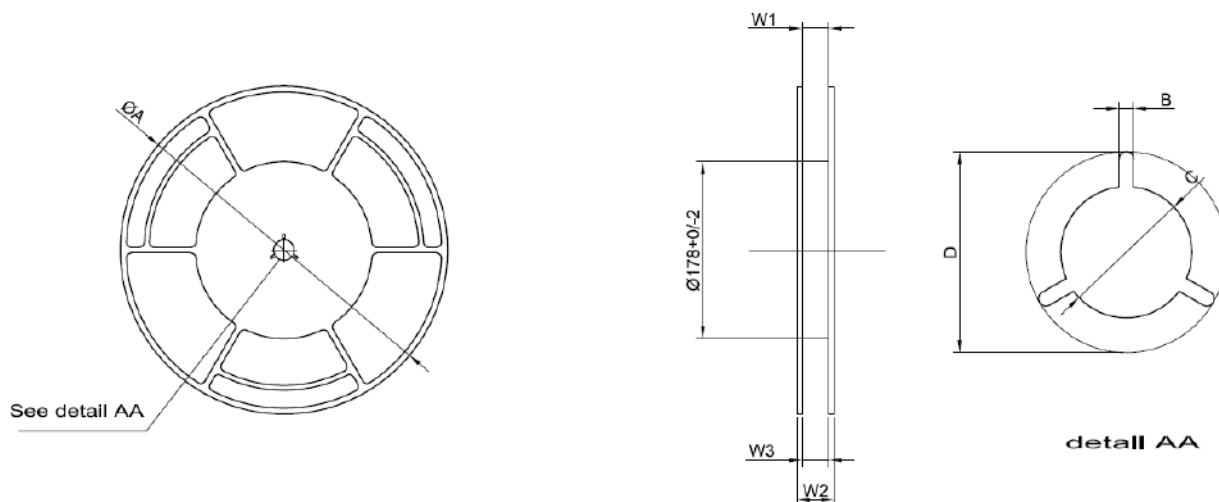
Transient Thermal Response Curves



Recommended Soldering Footprint

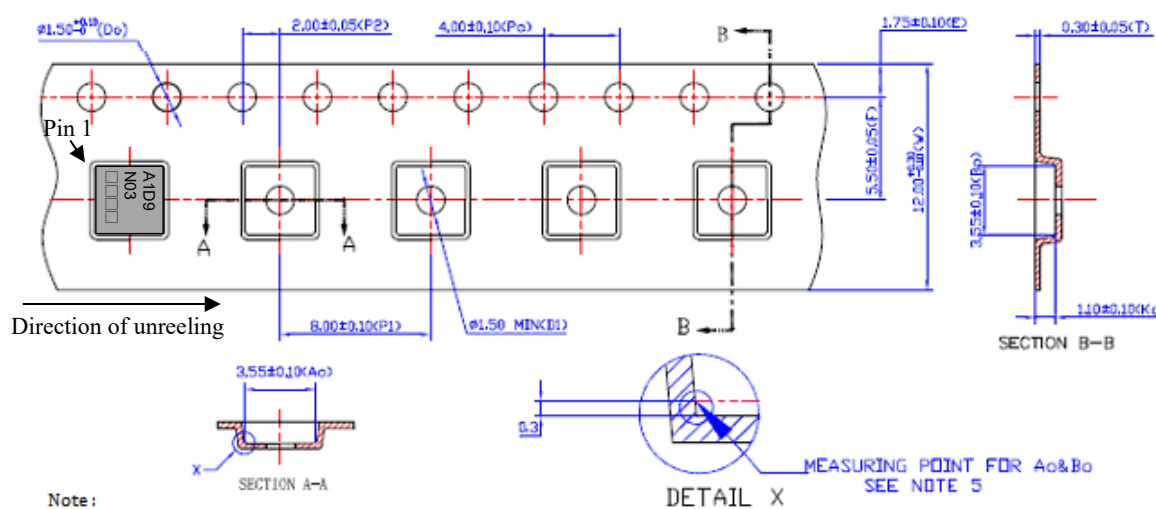


Reel Dimension



TAPE SIZE	A	B	C	D	W1	W2	W3
12mm	330 ± 2.0	2.9 ± 0.5	$13.0 \pm 0.5/-0$	23 ± 1.0	$12.4 \pm 2/-0$	18.4 ± 0.5	12~15

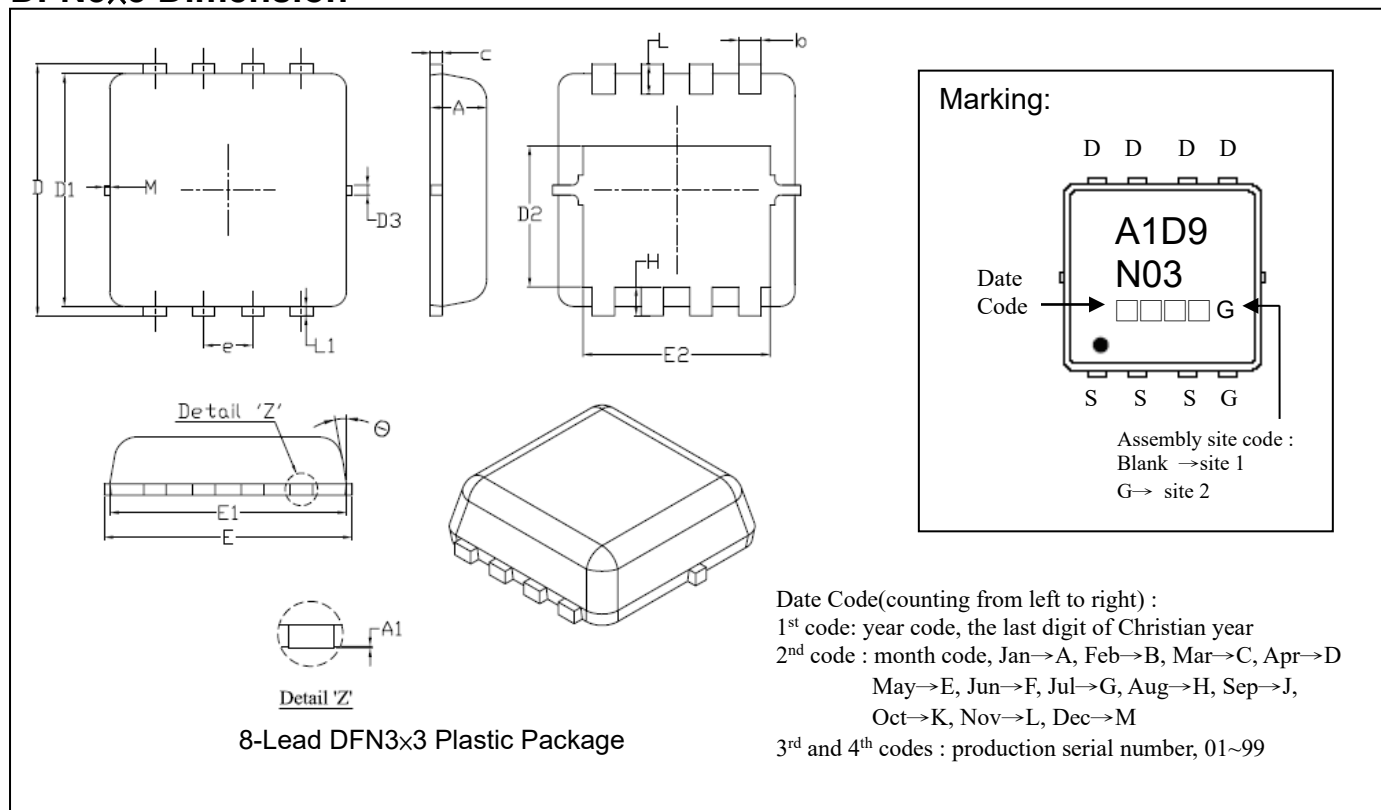
Carrier Tape Dimension



Note :

- 1.10 sprocket hole pitch cumulative tolerance : ± 0.2 mm.
- 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 : $1 \times 10^4 \sim 1 \times 10^{11}$ ohms/sq

DFN3x3 Dimension



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
A1	0.00	0.05	0.000	0.002	E2	2.39	2.59	0.094	0.102
b	0.25	0.35	0.010	0.014	e	0.65	BSC	0.026	BSC
c	0.10	0.25	0.004	0.010	H	0.30	0.50	0.012	0.020
D	3.25	3.45	0.128	0.136	L	0.30	0.50	0.012	0.020
D1	3.00	3.20	0.118	0.126	L1	0.13	TYP	0.005	TYP
D2	1.78	1.98	0.070	0.078	θ	-	12°	-	12°
D3	0.13	TYP	0.005	TYP	M	-	0.15	-	0.006
E	3.00	3.40	0.118	0.134					