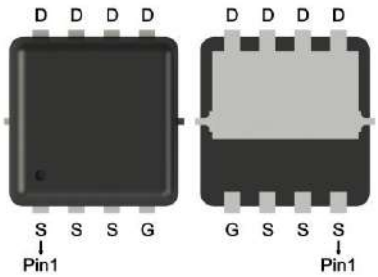
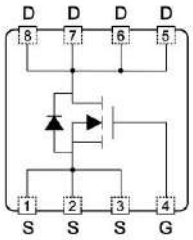
N-Channel Enhancement Mode Power MOSFET

DFN3×3





Features:

- Low Gate Charge
- Fast Switching Characteristic
- Pb-free lead plating and halogen-free

BV_{DSS}	40	V
$R_{DS(ON)}$ typ. @ V_{GS}=10V, I_D=12A	4.2	mΩ
$R_{DS(ON)}$ typ. @ V_{GS}=4.5V, I_D=10A	6.2	
I_D @ V_{GS}=10V, T_C=25°C	26	A
I_D @ V_{GS}=10V, T_A=25°C	13	

Ordering Information

Device	Package	Shipping
KSPRB4D2N04R	DFN3×3	3000pcs / Tape & Reel

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (silicon limit)	*a	I_D	52	A
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (package limit)	*a		26	
Continuous Drain Current @ V_{GS}=10V, T_C=100°C	*a		26	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C	*b		13	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C	*b		10	
Pulsed Drain Current	*c	I_{DM}	104	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	26	
Pulsed Body Diode Forward Current @ T_C=25°C	*a	I_{SM}	104	
Avalanche Current @ L=0.1mH		I_{AS}	18	
Avalanche Energy @ L=0.5mH		E_{AS}	25	mJ
Total Power Dissipation	T_C=25°C *a	P_D	33	W
	T_C=100°C *a		13	
	T_A=25°C *b		2	
	T_A=70°C *b		1.3	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	°C
Steady State Thermal Resistance, Junction-to-Case		$R_{\theta JC}$	3.8	°C/W
Steady State Thermal Resistance, Junction-to-Ambient	*b	$R_{\theta JA}$	62	

Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1	-	2.5		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	16	-	S	V_{DS}=10V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=32V, V_{GS}=0V
$R_{DS(ON)}$	-	4.2	5.5	mΩ	V_{GS}=10V, I_D=12A
	-	6.2	8.8		V_{GS}=4.5V, I_D=10A
Dynamic					
C_{iss}	-	1300	-	pF	V_{DS}=20V, V_{GS}=0V, f=1MHz
C_{oss}	-	500	-		
C_{rss}	-	35	-		
R_g	-	1	-	Ω	f=1MHz
Q_g *d,e	-	11	-	nC	V_{DS}=20V, I_D=12A, V_{GS}=4.5V
Q_g *d,e	-	23	-		V_{DS}=20V, I_D=12A, V_{GS}=10V
Q_{gs} *d,e	-	4.5	-		
Q_{gd} *d,e	-	3.7	-		
$t_{d(ON)}$ *d,e	-	12	-	ns	V_{DS}=20V, I_D=12A, V_{GS}=10V, R_{GS}=1Ω
tr *d,e	-	13	-		
$t_{d(OFF)}$ *d,e	-	36	-		
t_f *d,e	-	7	-		
Source-Drain Diode					
V_{SD} *d	-	0.83	1.2	V	I_S=12A, V_{GS}=0V
t_{rr}	-	21	-	ns	I_F=12A, di/dt=100A/μs
Q_{rr}	-	7.8	-	nC	

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.

*b. The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz 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.

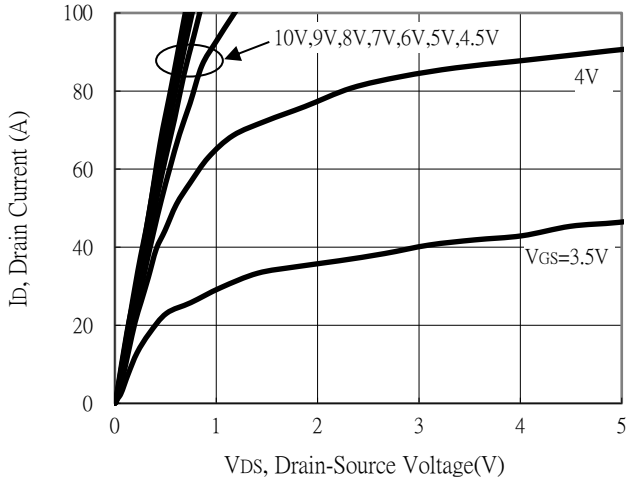
*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C.

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

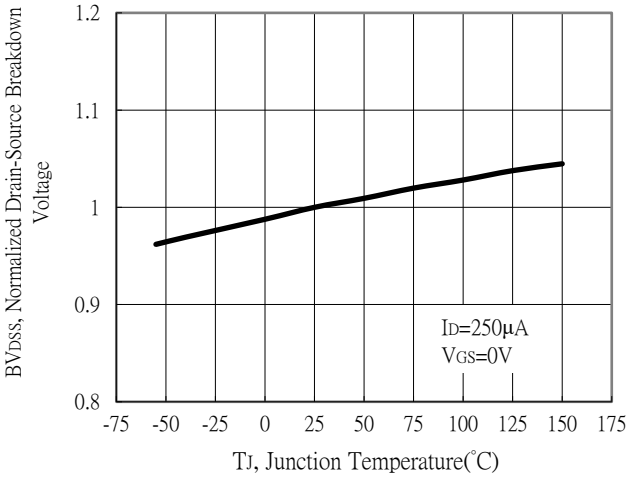
*e. Independent of operating temperature.

Typical Characteristics

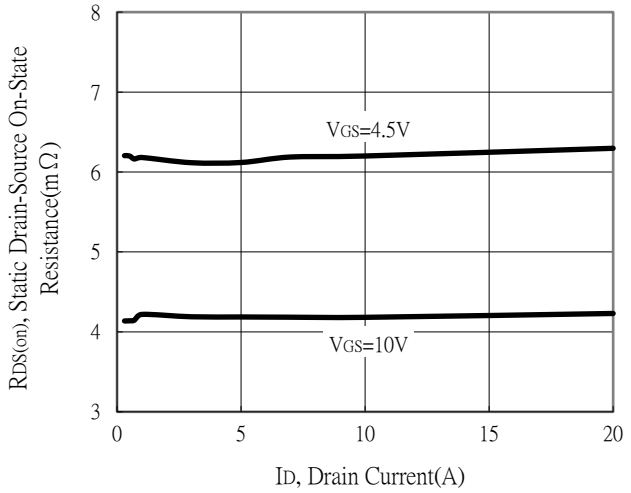
Typical Output Characteristics



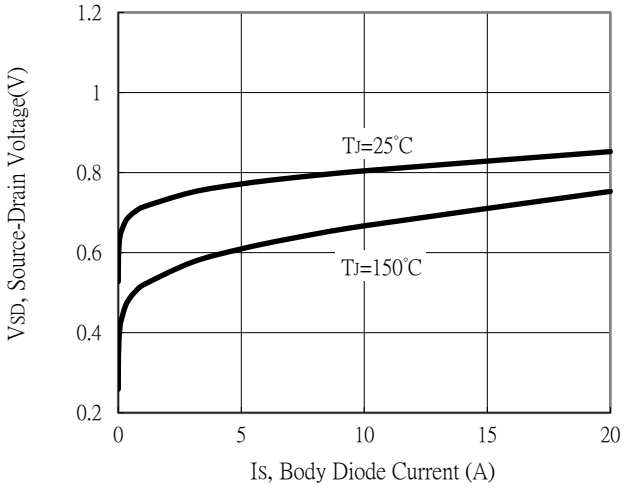
Breakdown Voltage vs Ambient Temperature



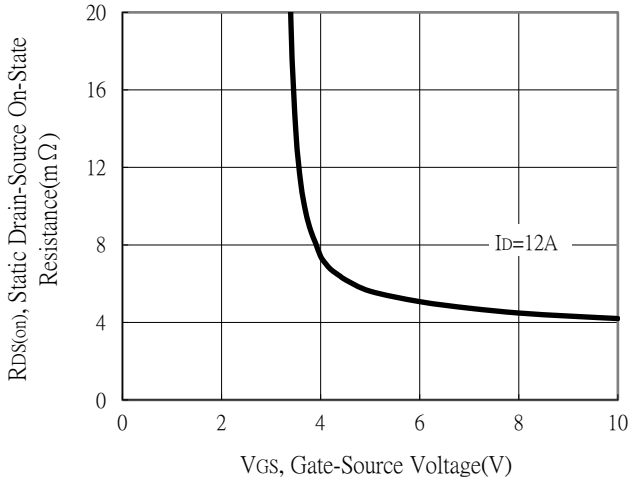
Static Drain-Source On-State resistance vs Drain Current



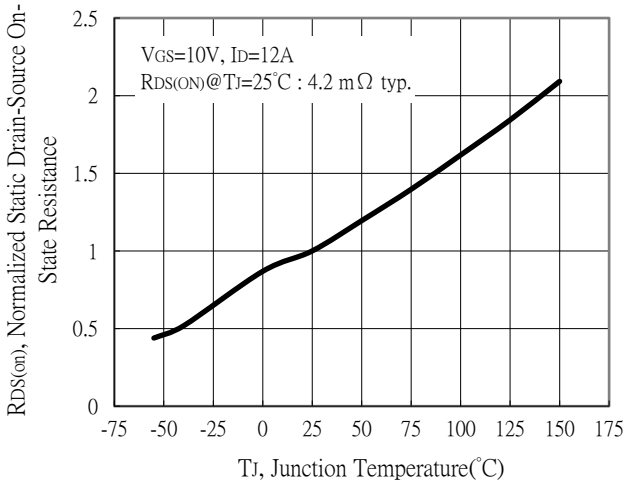
Body Diode Current vs Source-Drain Voltage



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

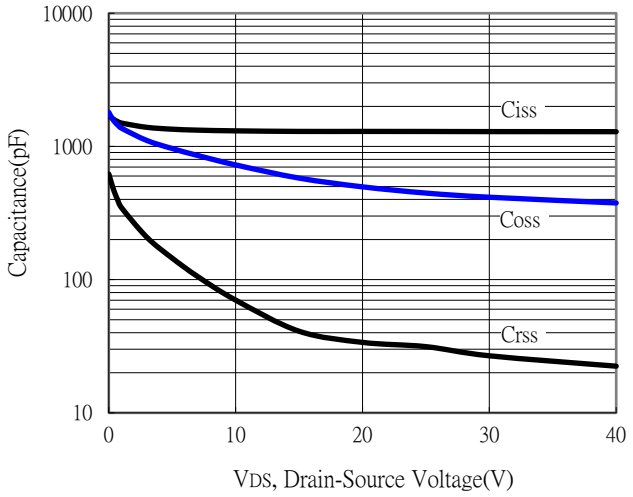


Drain-Source On-State Resistance vs Junction Temperature

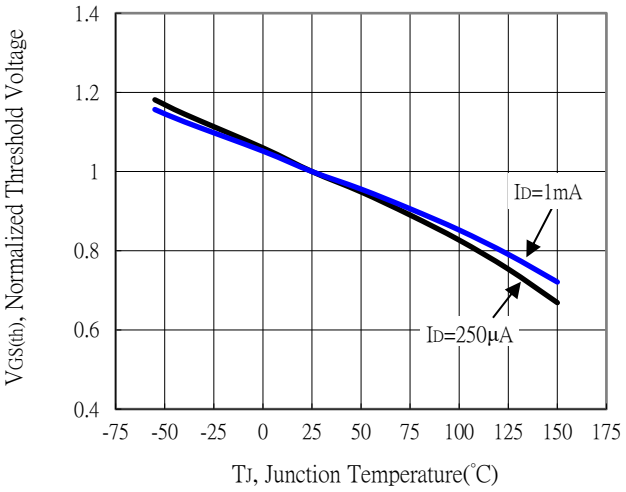


Typical Characteristics

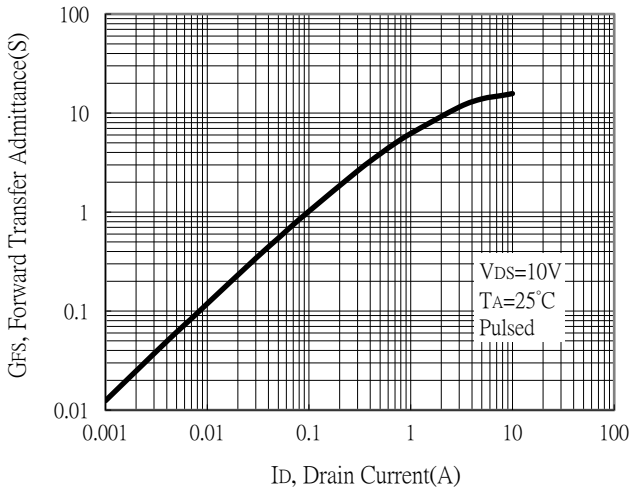
Capacitance vs Drain-to-Source Voltage



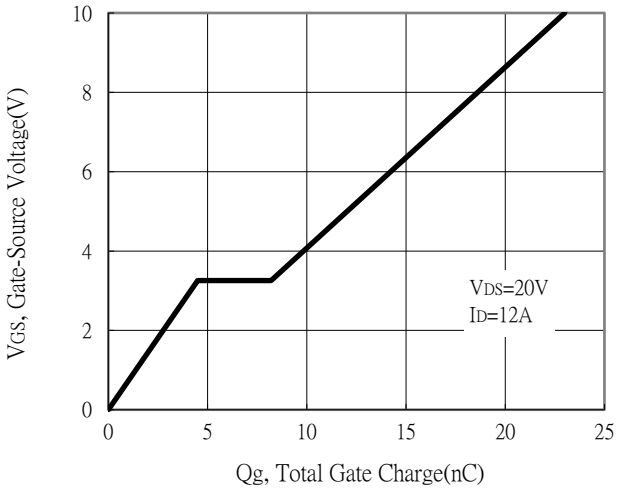
Threshold Voltage vs Junction Temperature



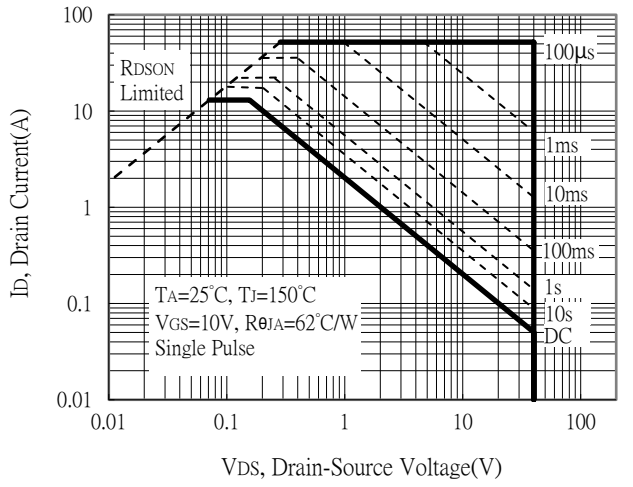
Forward Transfer Admittance vs Drain Current



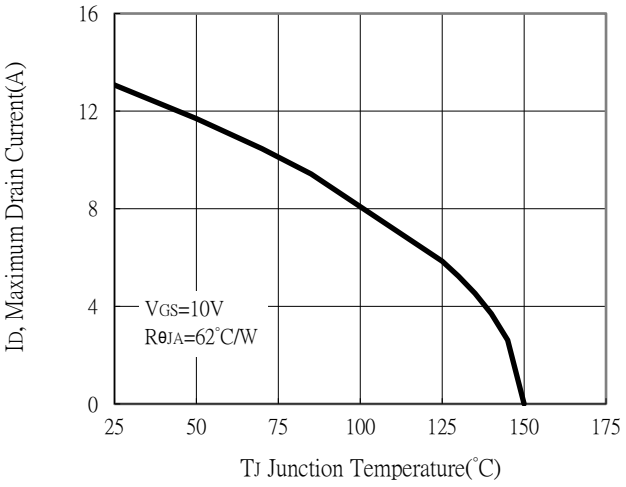
Gate Charge Characteristics



Maximum Safe Operating Area

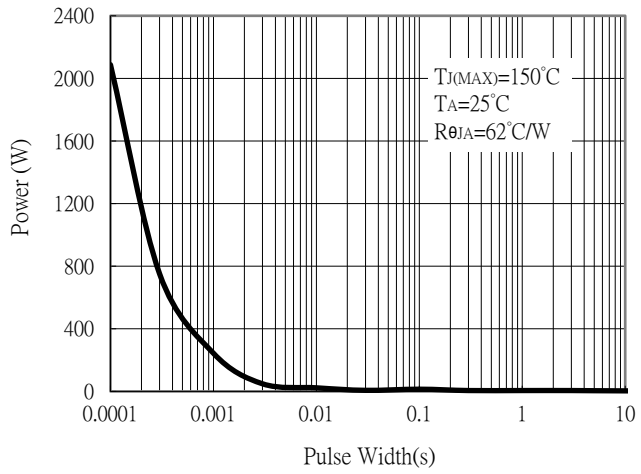


Maximum Drain Current vs Junction Temperature

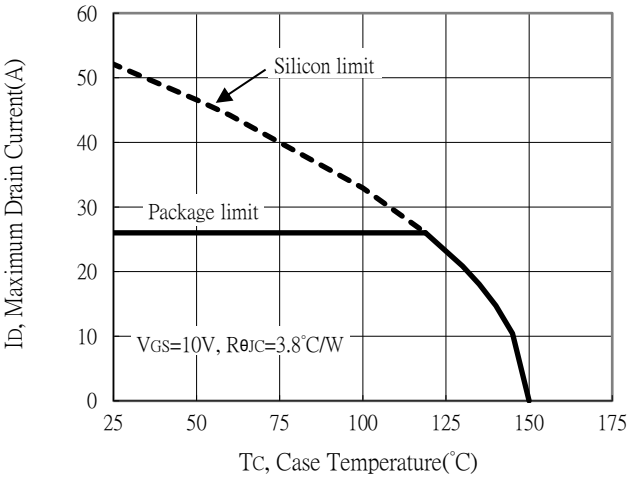


Typical Characteristics

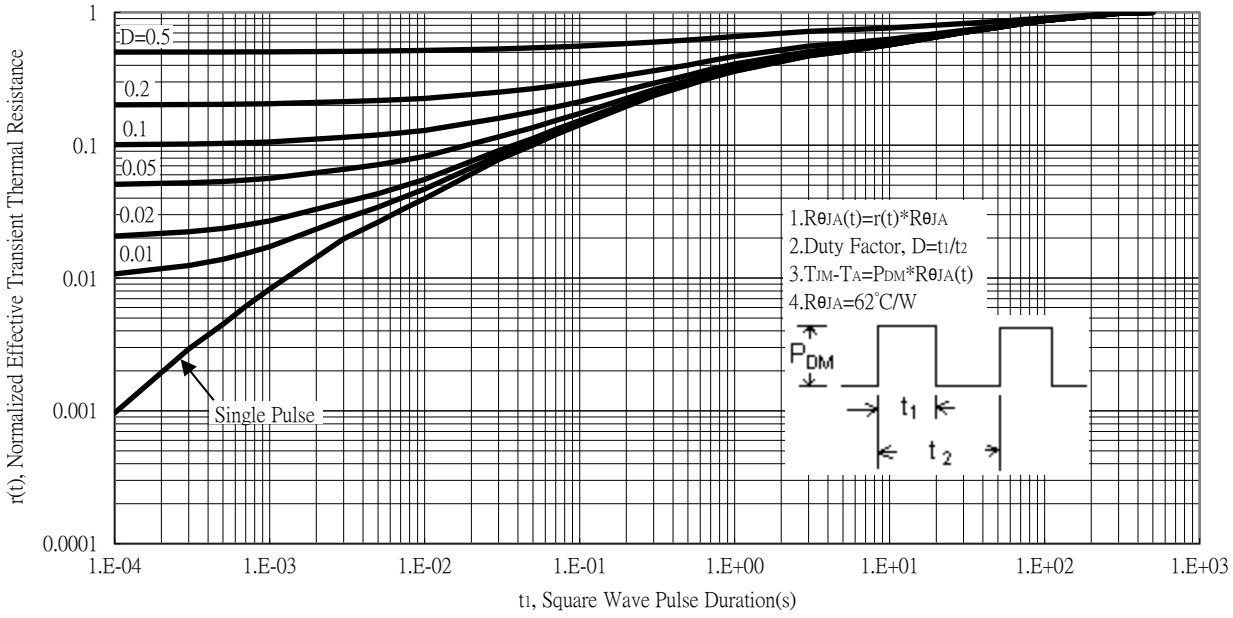
Single Pulse Power Rating, Junction to Ambient



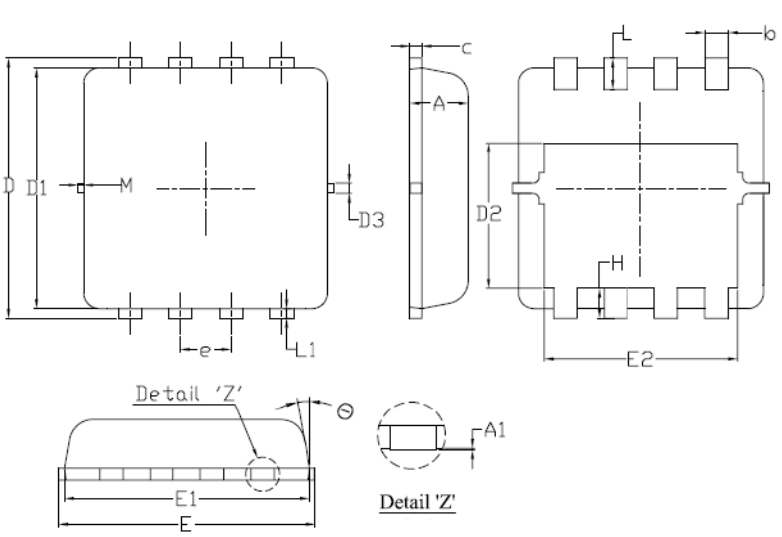
Maximum Drain Current vs Case Temperature



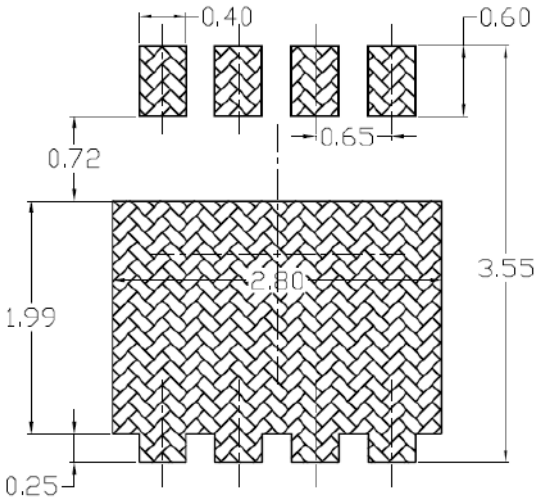
Transient Thermal Response Curves



DFN3×3 Dimension



8-Lead DFN3×3 Plastic Package

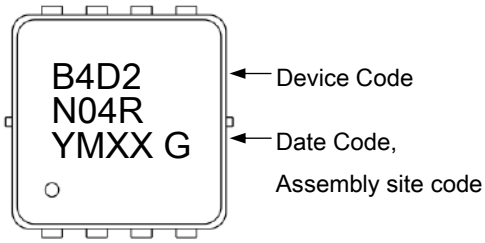


Recommended Soldering Footprint

Unit : mm

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Min.		Min.	Max.	Min.	Max.
A	0.70	0.80	0.028	0.031	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	0.077	K	0.30	-	0.012	-
D3	0.13	TYP	0.005	TYP	θ	-	12°	-	12°
E	3.00	3.40	0.118	0.134	M	-	0.15	-	0.006
E1	3.00	3.20	0.118	0.126					

Marking

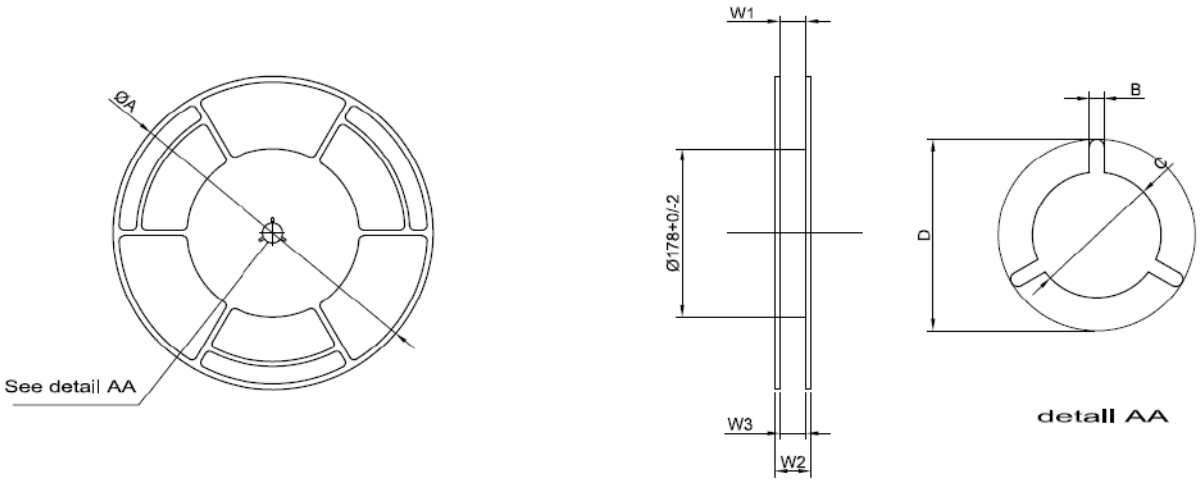


YMXX: Date Code Marking
Y: Year Code, the last digit of Christian year
M: Month Code

A: Jan	B: Feb	C: Mar	D: Apr	E: May	F: Jun
G: Jul	H: Aug	J: Sep	K: Oct	L: Nov	M: Dec

XX: Production Serial Number, 01~99

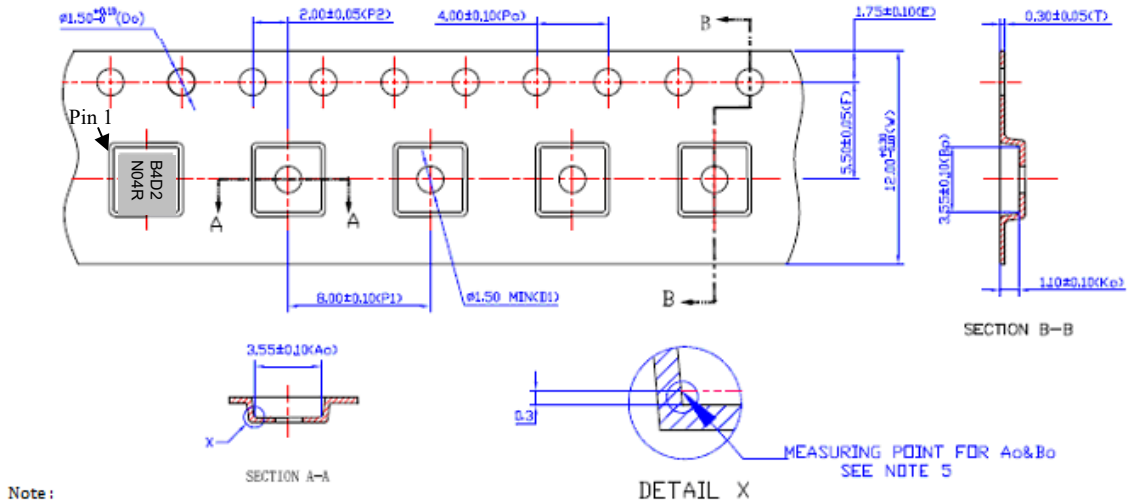
Reel Dimension



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

Unit；mm

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

Unit；mm