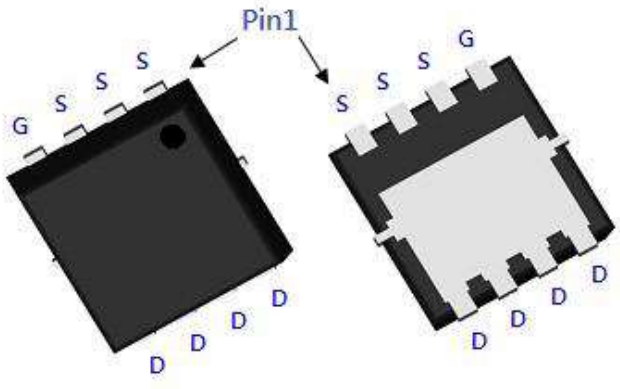
N-Channel Enhancement Mode Power MOSFET

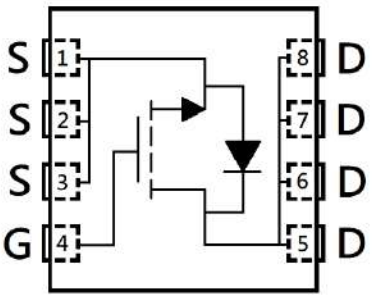
Features:

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

DFN3×3



BV_{DSS}	40V
I_D@V_{GS}=10V, T_C=25°C (silicon limit)	46A
I_D@V_{GS}=10V, T_C=25°C (package limit)	26A
I_D@V_{GS}=10V, T_A=25°C	13A
$R_{DS(ON)}$ typ.@V_{GS}=10V, I_D=15A	3.4mΩ
$R_{DS(ON)}$ typ.@V_{GS}=4.5V, I_D=10A	5 mΩ



G : Gate S : Source D : Drain

Ordering Information

Device	Package	Shipping
KSPRB3D6N04R	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}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (silicon limit)	*a	I_D	46	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		29	
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	20	
Avalanche Current @ L=0.1mH		I_{AS}	22	
Avalanche Energy @ L=0.5mH		E_{AS}	42	mJ
Total Power Dissipation	T_C=25°C *a	P_D	24	
	T_C=100°C *a		9.6	
	T_A=25°C *b		2.7	
	T_A=70°C *b		1.1	
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		$R_{\theta JC}$	5.2	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	71	

Note:

*a. The power dissipation P_D is based on $T_{J(MAX)}$=150℃, 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 in^2 FR -4 board with 2 oz. copper, in a still air environment with T_A=25℃. The power dissipation P_D is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150℃. 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℃. Ratings are based on low frequency and low duty cycles to keep initial T_J=25℃.

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}	-	29	-	S	V_{DS}=5V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=32V, V_{GS}=0V
$R_{DS(ON)}$	-	3.4	4.4	mΩ	V_{GS}=10V, I_D=15A
	-	5	7		V_{GS}=4.5V, I_D=10A
Dynamic					
Ciss	-	1540	-	pF	V_{DS}=20V, V_{GS}=0V, f=1MHz
Coss	-	935	-		
Crss	-	75	-		
Rg	-	1	-	Ω	f=1MHz
Qg *1, 2	-	27	-	nC	V_{DS}=20V, I_D=15A, V_{GS}=10V
Qgs *1, 2	-	4.7	-		
Qgd *1, 2	-	5.3	-		
$t_{d(ON)}$ *1, 2	-	13.5	-	ns	V_{DS}=20V, I_D=15A, V_{GS}=10V, R_{GS}=1Ω
tr *1, 2	-	14	-		
$t_{d(OFF)}$ *1, 2	-	40	-		
t_f *1, 2	-	9	-		
Source-Drain Diode					
V_{SD} *1	-	0.8	1.2	V	I_S=15A, V_{GS}=0V
trr	-	34	-	ns	I_F=15A, dI_F/dt=100A/μs
Qrr	-	19	-	nC	

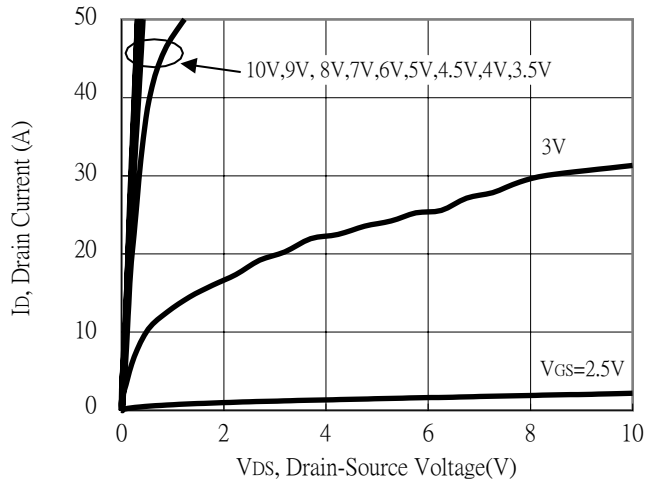
Note:

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

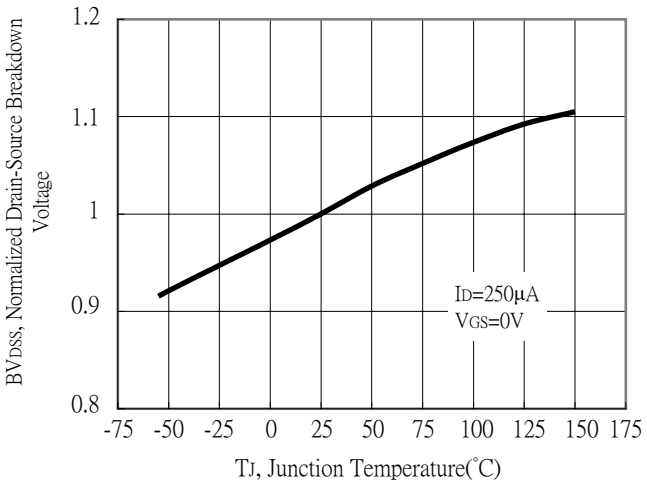
*2. Independent of operating temperature

Typical Characteristics

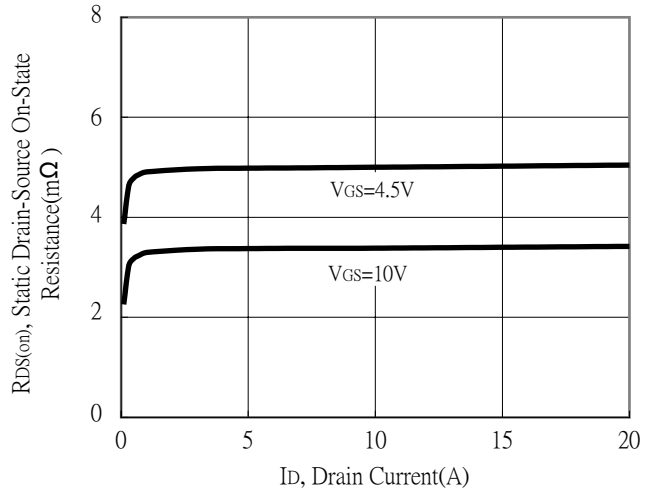
Typical Output Characteristics



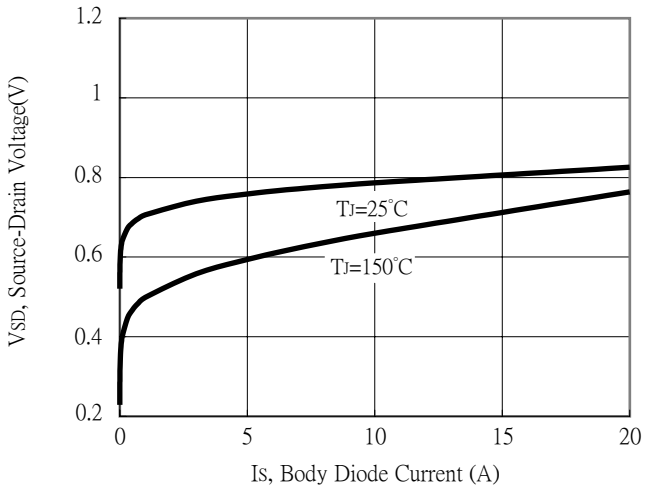
Breakdown Voltage vs Ambient Temperature



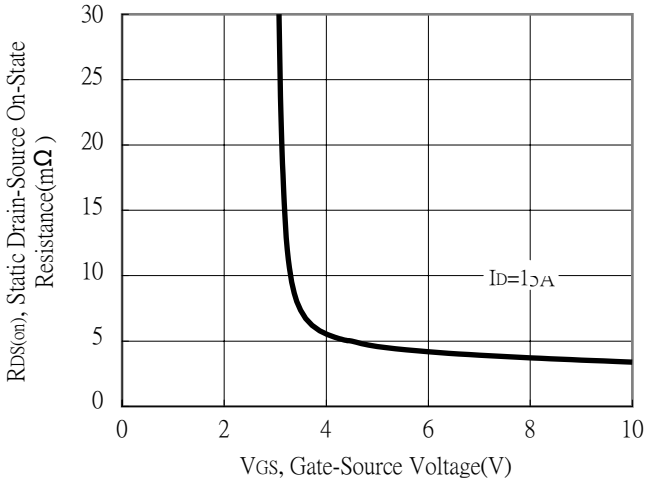
Static Drain-Source On-State resistance vs Drain Current



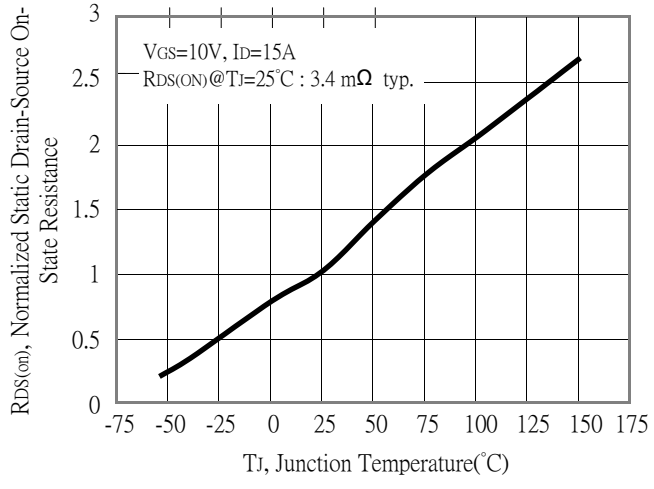
Body Diode Current vs Source-Drain Voltage



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

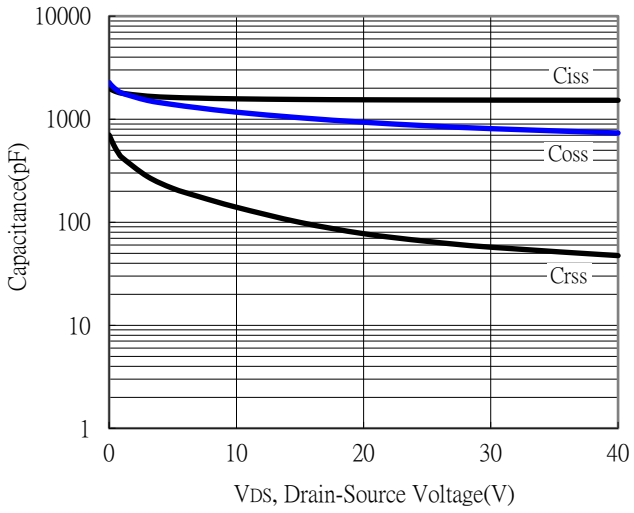


Drain-Source On-State Resistance vs Junction Temperature

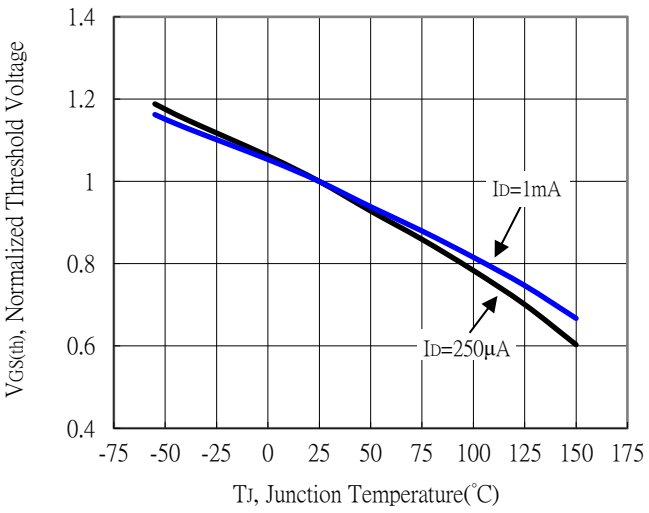


Typical Characteristics (Cont.)

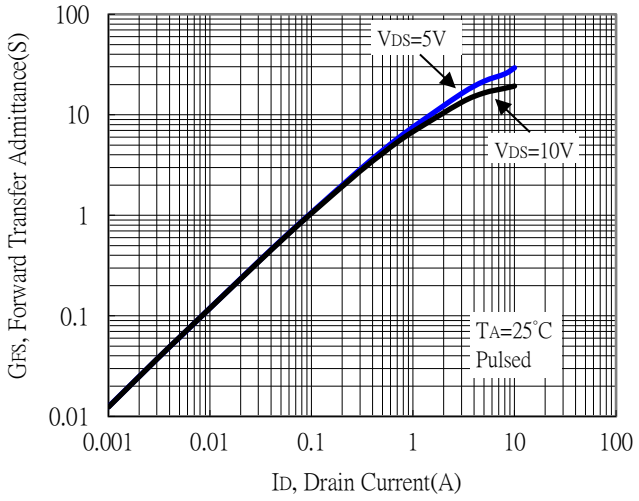
Capacitance vs Drain-to-Source Voltage



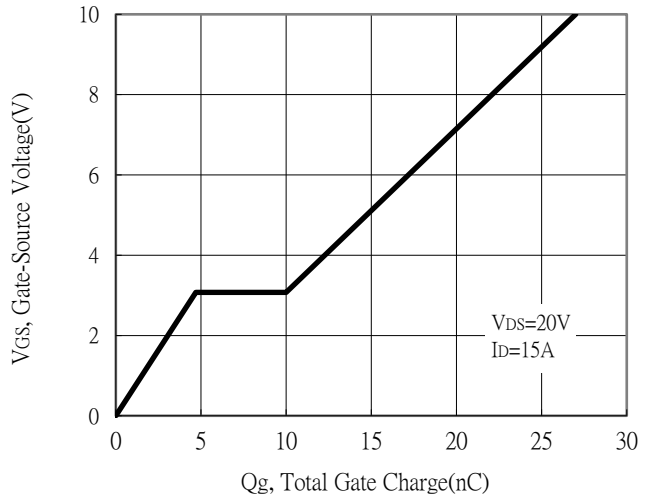
Threshold Voltage vs Junction Temperature



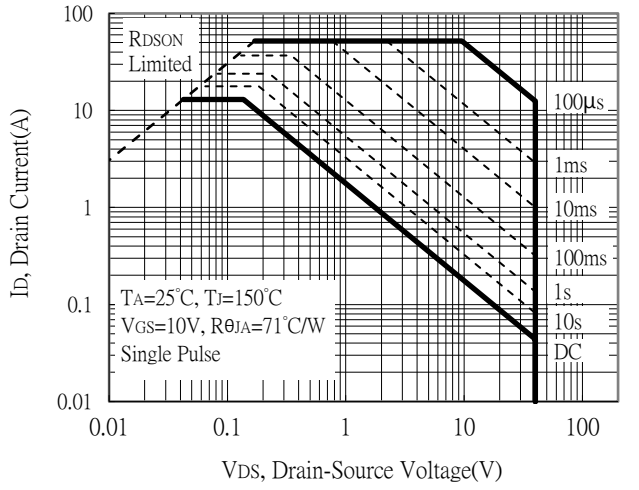
Forward Transfer Admittance vs Drain Current



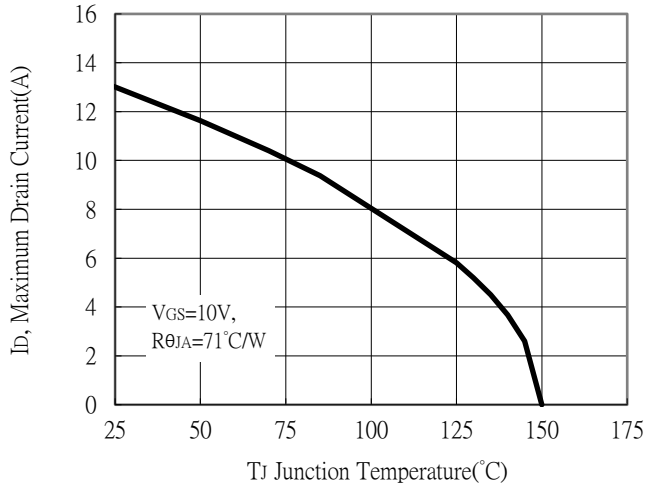
Gate Charge Characteristics



Maximum Safe Operating Area

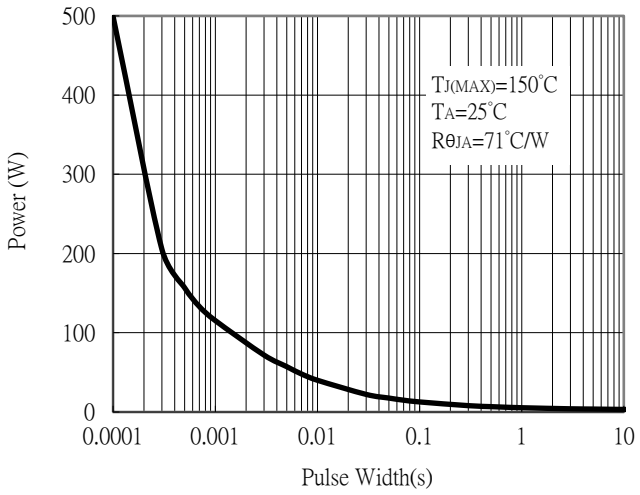


Maximum Drain Current vs Junction Temperature

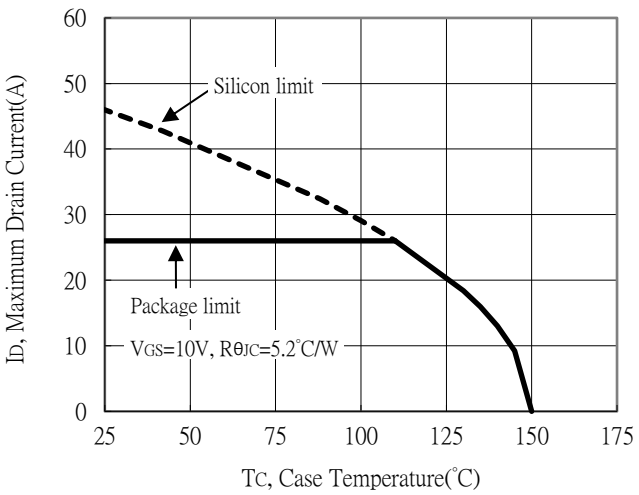


Typical Characteristics (Cont.)

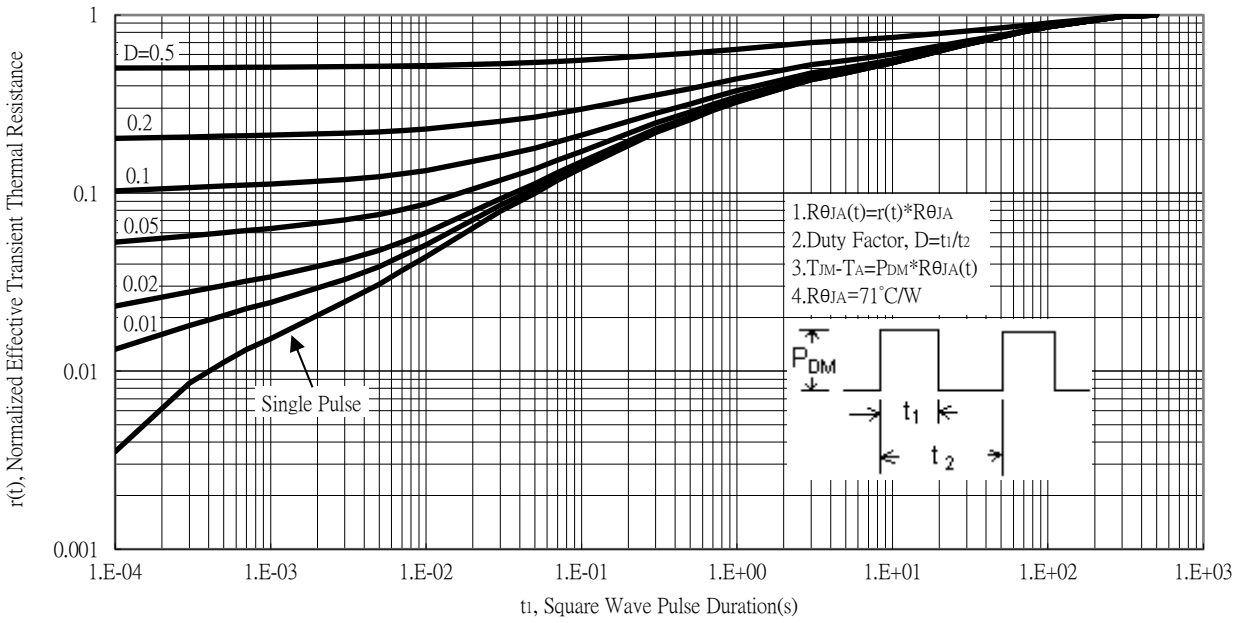
Single Pulse Power Rating, Junction to Ambient



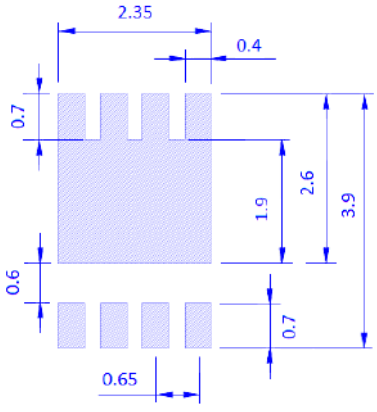
Maximum Drain Current vs Case Temperature



Transient Thermal Response Curves

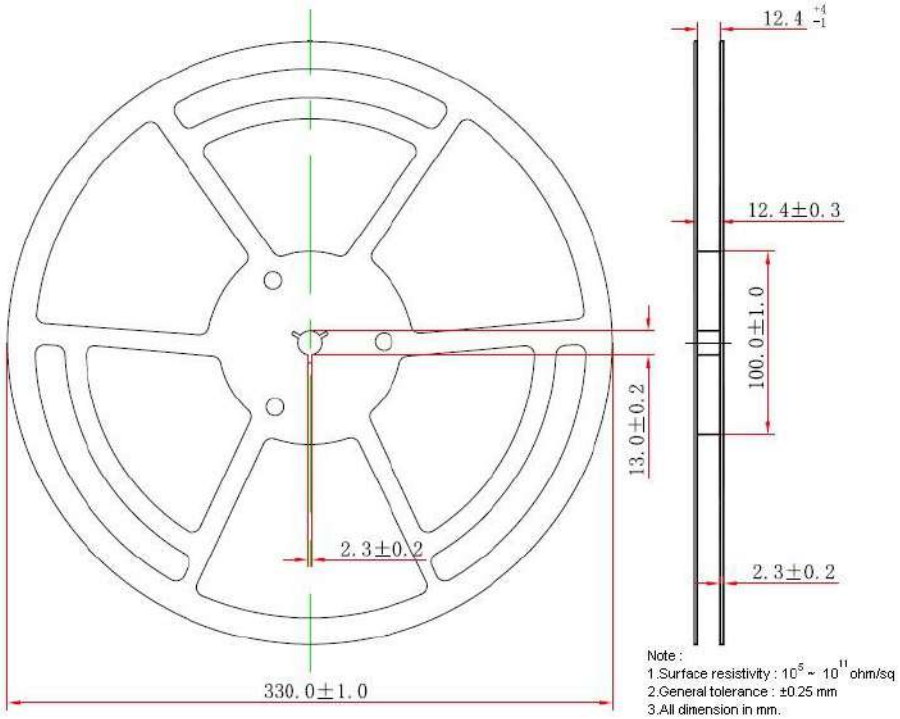


Recommended Soldering Footprint

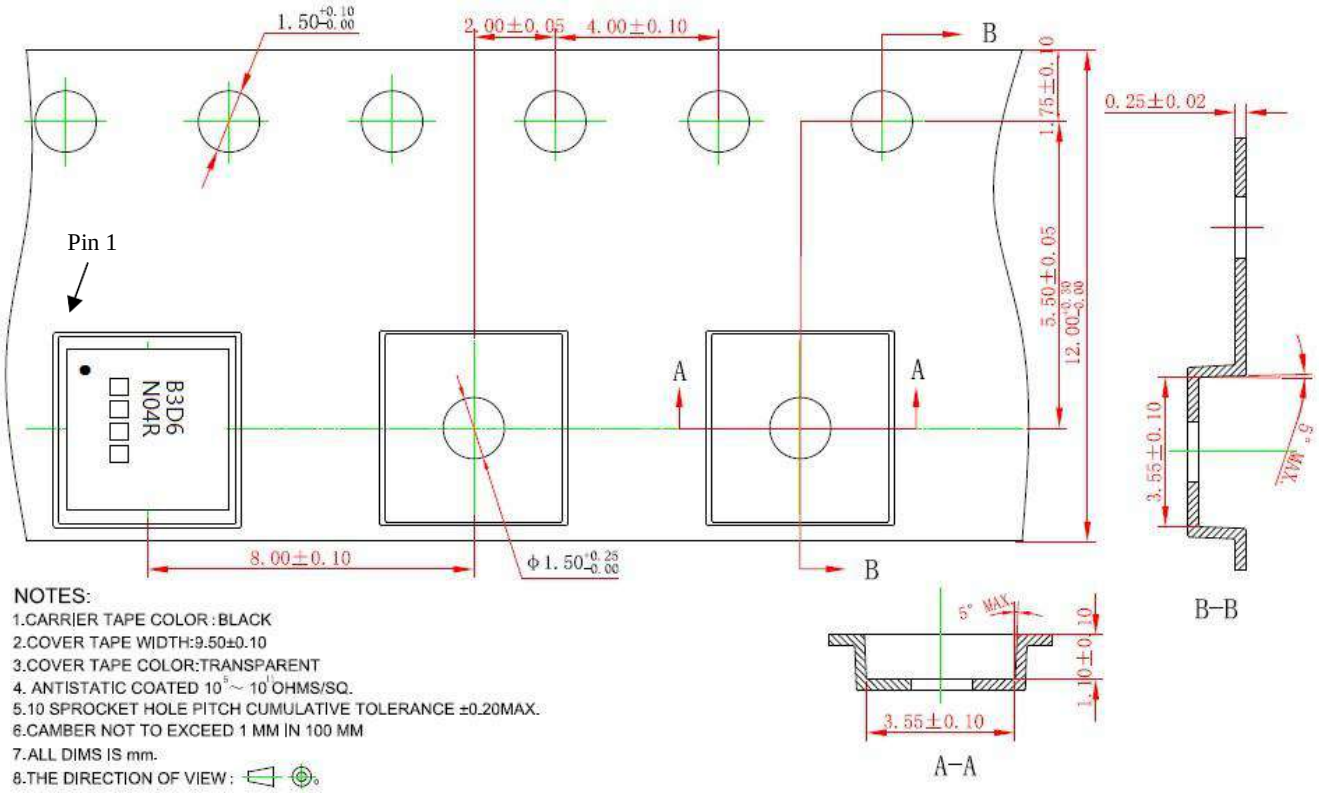


unit : mm

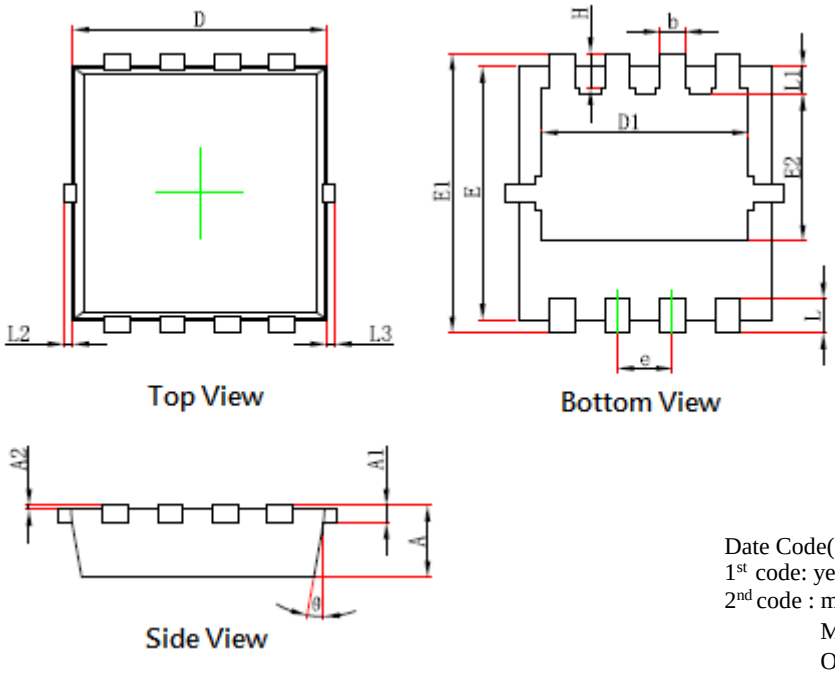
Reel Dimension



Carrier Tape Dimension



DFN3x3 Dimension



8-Lead DFN3x3 Plastic Package

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	0.026	0.033	0.650	0.850	b	0.008	0.016	0.200	0.400
A1	0.006	REF	0.152	REF	e	0.022	0.030	0.550	0.750
A2	0.000	0.002	0.000	0.050	L	0.012	0.020	0.300	0.500
D	0.114	0.126	2.900	3.200	L1	0.007	0.019	0.180	0.480
D1	0.091	0.102	2.300	2.600	L2	0.000	0.006	0.000	0.150
E	0.114	0.126	2.900	3.200	L3	0.000	0.006	0.000	0.150
E1	0.124	0.136	3.150	3.450	H	0.012	0.020	0.300	0.515
E2	0.058	0.076	1.480	1.935	θ	8°	13°	8°	13°