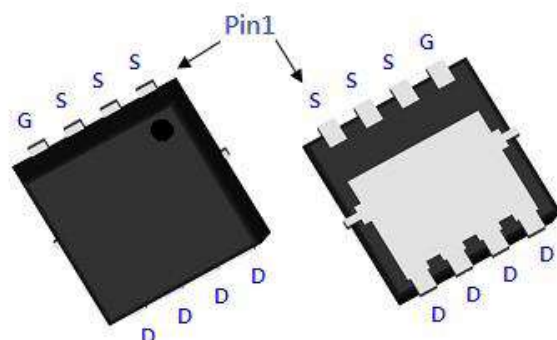


N-Channel Enhancement Mode Power MOSFET

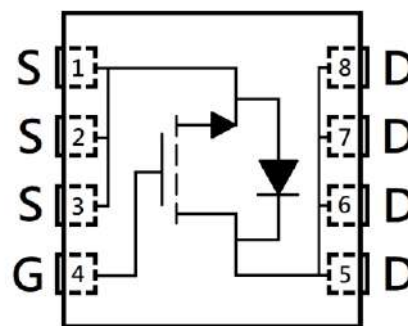
Features:

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

DFN3x3



BV_{DSS}	40V
$I_D @ V_{GS}=10V, T_C=25^\circ C$	24A
$I_D @ V_{GS}=10V, T_A=25^\circ C$	13A
$R_{DS(ON)} @ V_{GS}=10V, I_D=13A$	5.4m Ω
$R_{DS(ON)} @ V_{GS}=4.5V, I_D=10A$	7m Ω



G : Gate S : Source D : Drain

Ordering Information

Device	Package	Shipping
KSPRB4D8N04R	DFN3x3 (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	40	A	
Continuous Drain Current @ V _{GS} =10V, T _C =25°C (package limit) *a		24		
Continuous Drain Current @ V _{GS} =10V, T _C =100°C (package limit) *a		24		
Continuous Drain Current @ V _{GS} =10V, T _A =25°C *b		13		
Continuous Drain Current @ V _{GS} =10V, T _A =70°C *b		11		
Pulsed Drain Current *c		I _{DM}		96
Continuous Body Diode Forward Current @ T _C =25°C *a	I _S	20		
Avalanche Current @ L=0.1mH	I _{AS}	17		
Avalanche Energy @ L=0.5mH	E _{AS}	20	mJ	
Total Power Dissipation	P _D	T _C =25°C *a	24	W
		T _C =100°C *a	9	
		T _A =25°C *b	2.4	
		T _A =70°C *b	1.5	
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}	5.3	°C/W
Thermal Resistance, Junction-to-ambient *b	R _{θJA}	53	

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_D 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					
B _V DSS	40	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	1	-	2.5		V _{DS} =V _{GS} , I _D =250μA
G _{FS}	-	20	-	S	V _{DS} =5V, I _D =15A
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =32V, V _{GS} =0V
R _{DS(ON)}	-	5.4	7	mΩ	V _{GS} =10V, I _D =13A
		7	10		V _{GS} =4.5V, I _D =10A
Dynamic					
C _{iss}	-	1050	-	pF	V _{DS} =20V, V _{GS} =0V, f=1MHz
C _{oss}	-	380	-		
C _{rss}	-	30	-		
R _g	-	1	-	Ω	f=1MHz
Q _g *1, 2	-	18	-	nC	V _{DS} =20V, I _D =13A, V _{GS} =10V
Q _{gs} *1, 2	-	3.4	-		
Q _{gd} *1, 2	-	3.1	-		
t _{d(ON)} *1, 2	-	10	-	ns	V _{DS} =20V, I _D =13A, V _{GS} =10V, R _{GS} =6Ω
t _r *1, 2	-	12	-		
t _{d(OFF)} *1, 2	-	34	-		
t _f *1, 2	-	6.5	-		
Source-Drain Diode					
V _{SD} *1	-	0.85	1.2	V	I _S =13A, V _{GS} =0V
t _{rr}	-	19	-	ns	I _F =13A, dI _F /dt=100A/μs
Q _{rr}	-	8	-	nC	

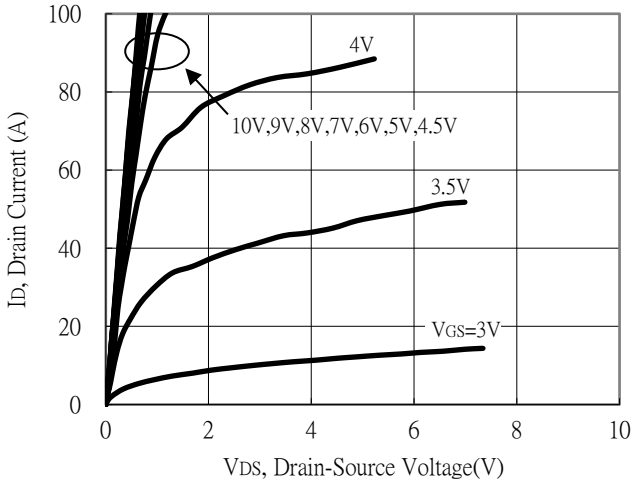
Note:

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

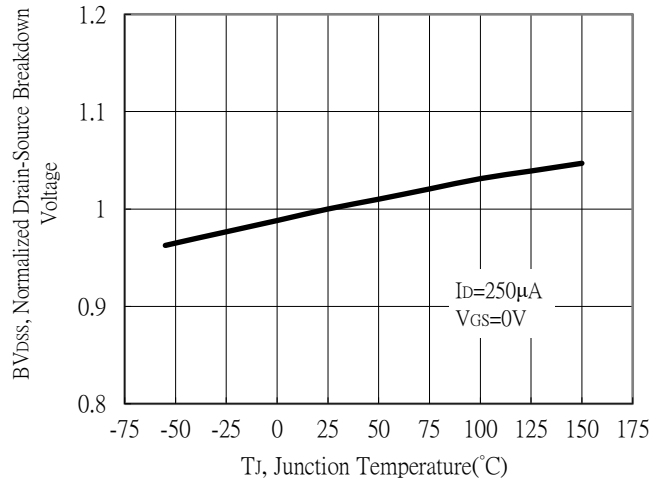
*2. Independent of operating temperature

Typical Characteristics

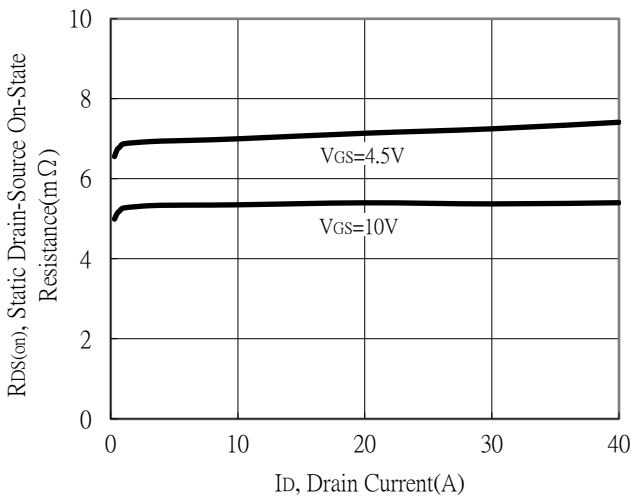
Typical Output Characteristics



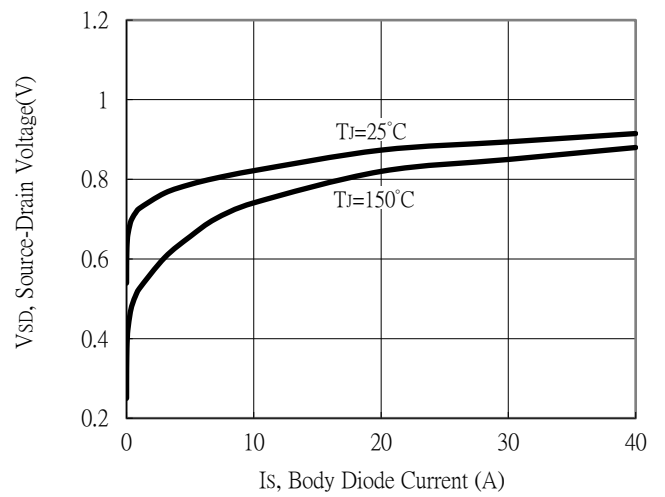
Breakdown Voltage vs Ambient Temperature



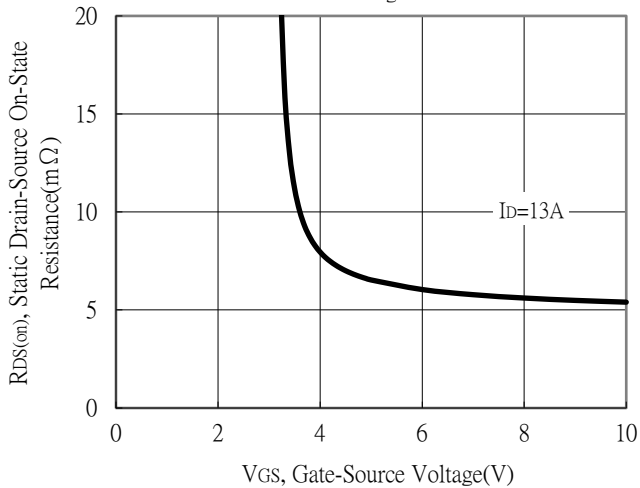
Static Drain-Source On-State resistance vs Drain Current



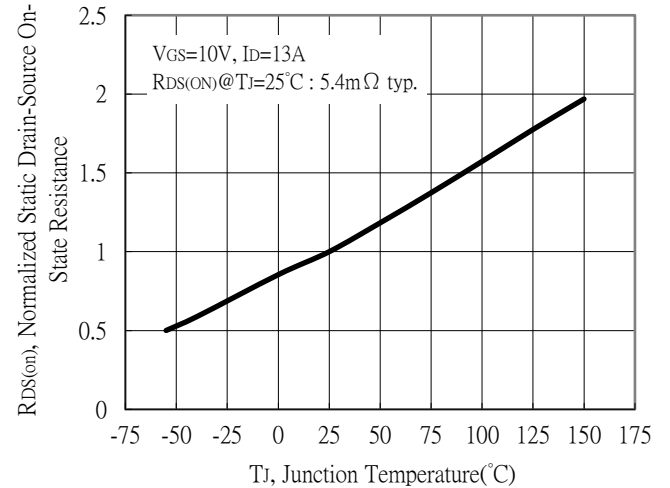
Body Diode Current vs Source-Drain Voltage



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

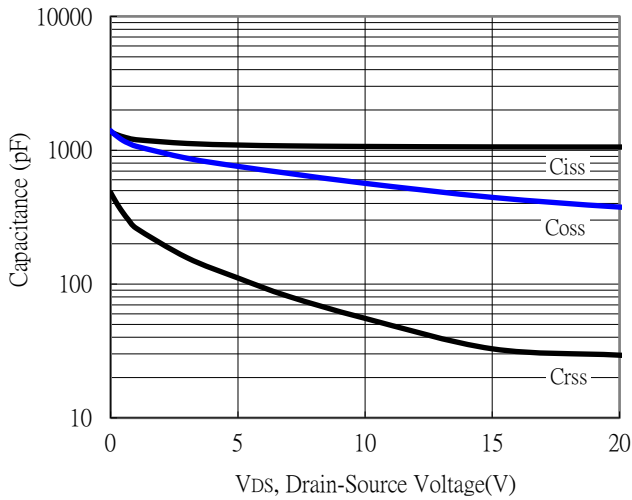


Drain-Source On-State Resistance vs Junction Temperature

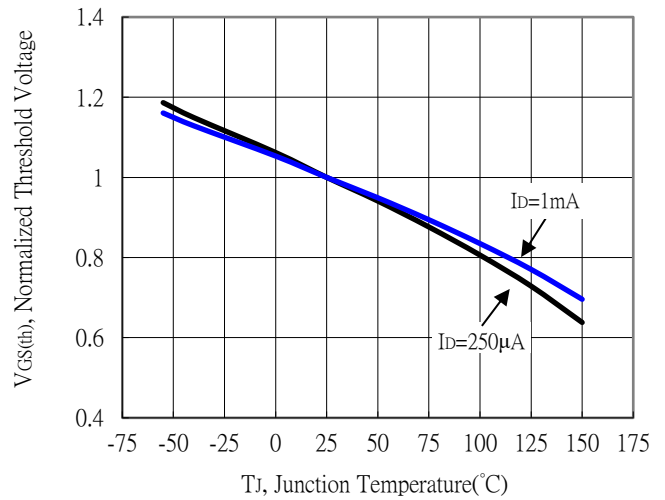


Typical Characteristics (Cont.)

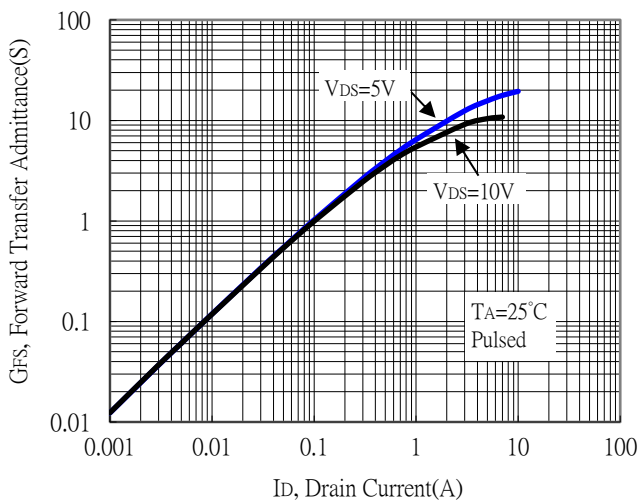
Capacitance vs Drain-to-Source Voltage



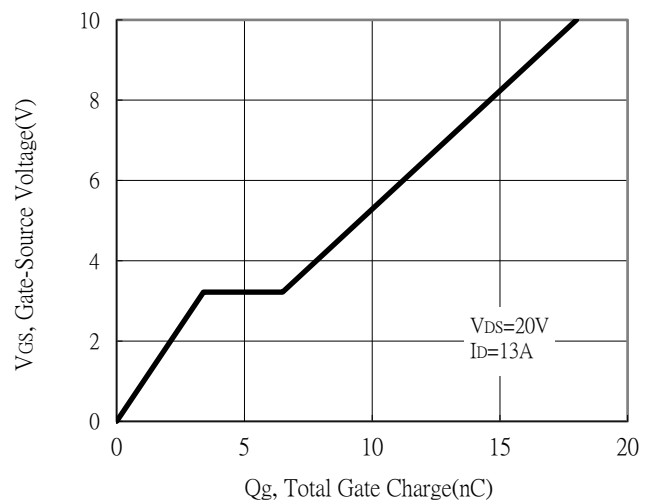
Threshold Voltage vs Junction Temperature



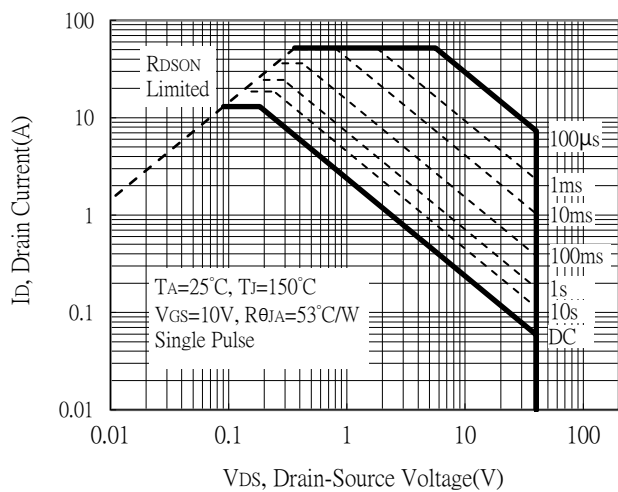
Forward Transfer Admittance vs Drain Current



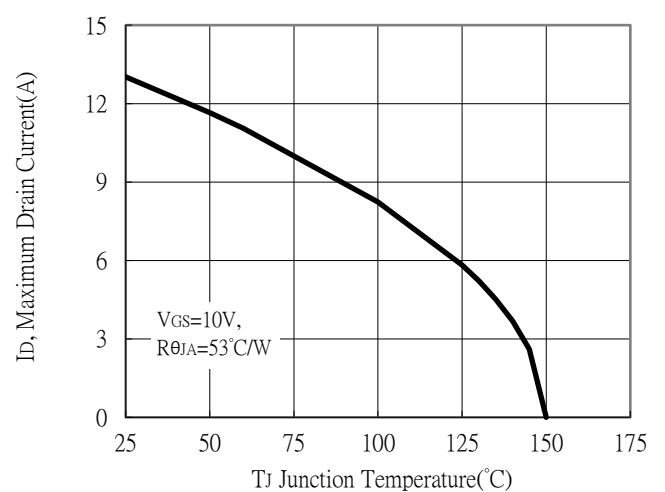
Gate Charge Characteristics



Maximum Safe Operating Area

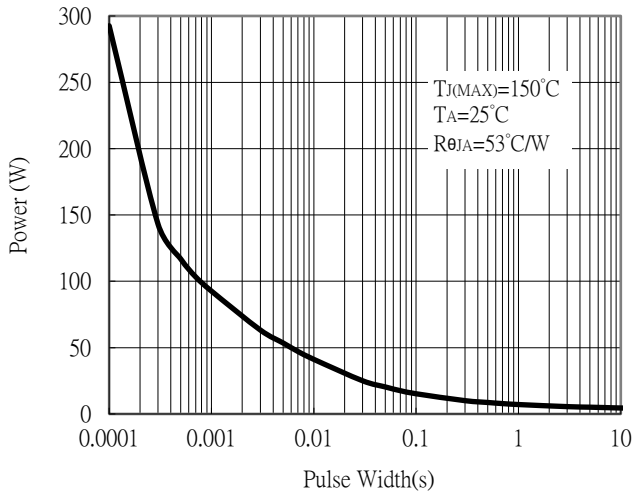


Maximum Drain Current vs Junction Temperature

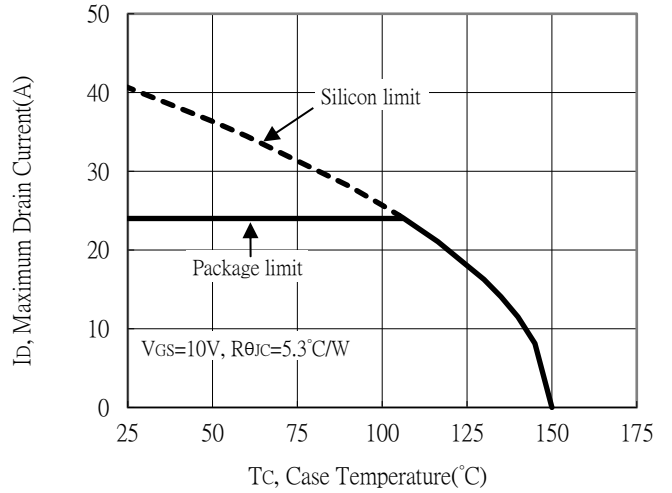


Typical Characteristics (Cont.)

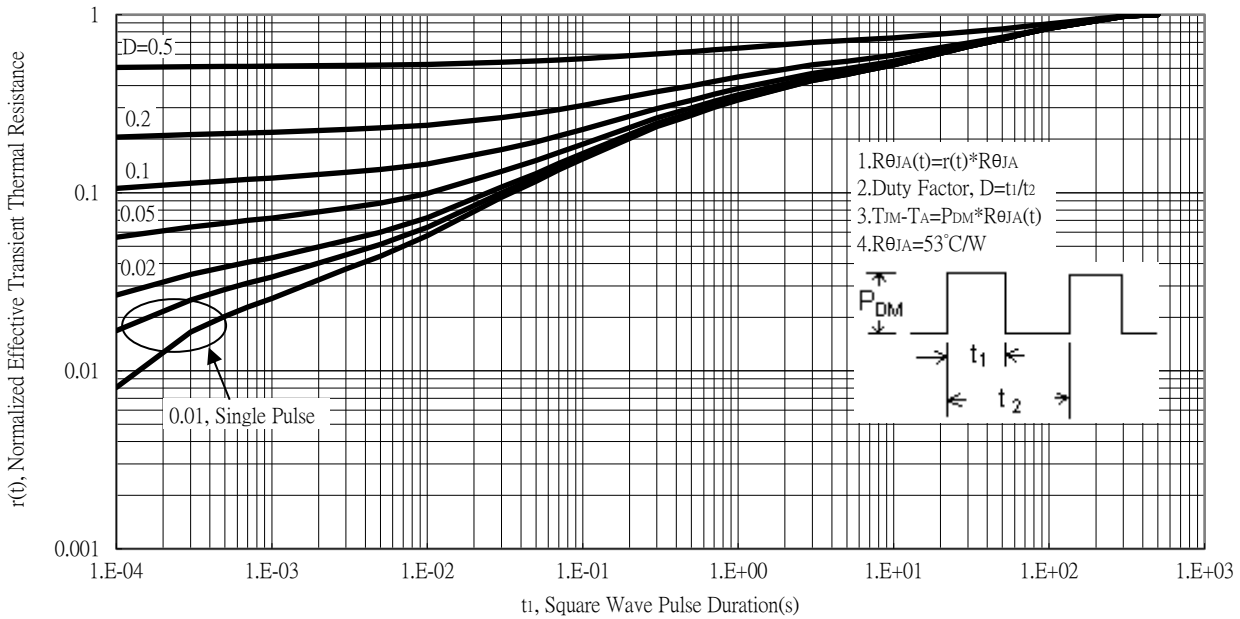
Single Pulse Power Rating, Junction to Ambient



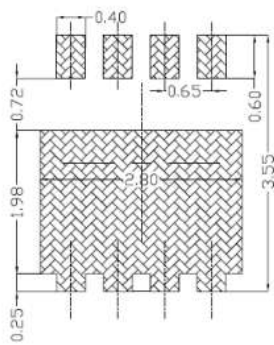
Maximum Drain Current vs Case Temperature



Transient Thermal Response Curves

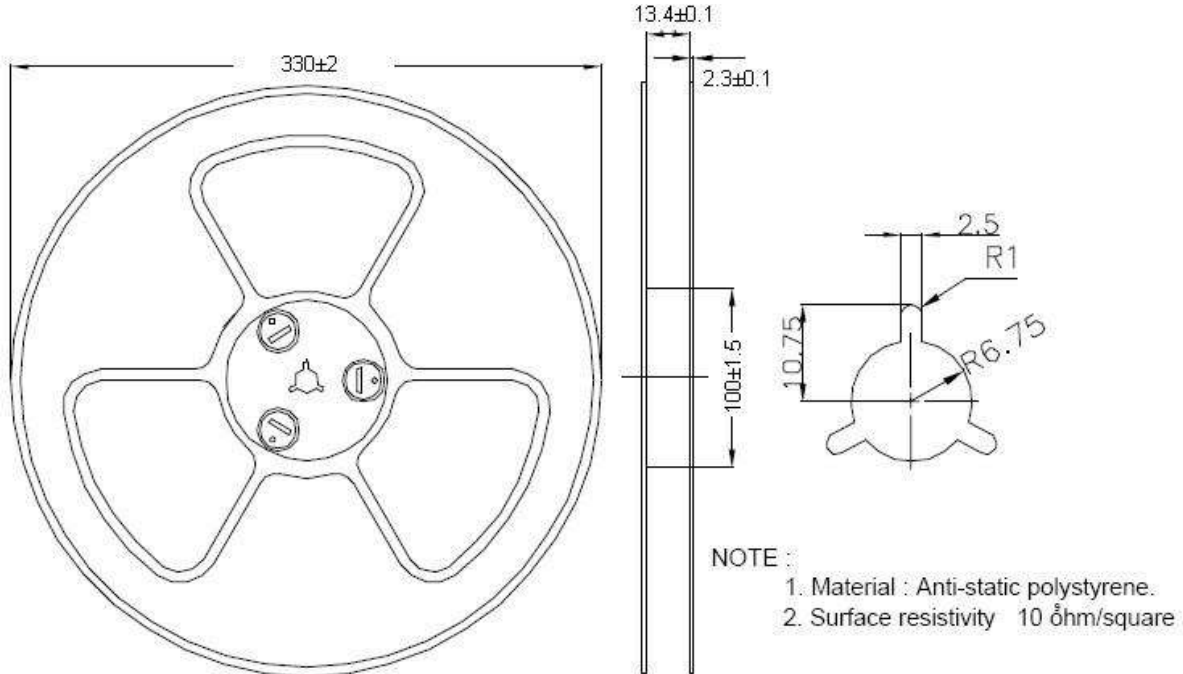


Recommended Soldering Footprint

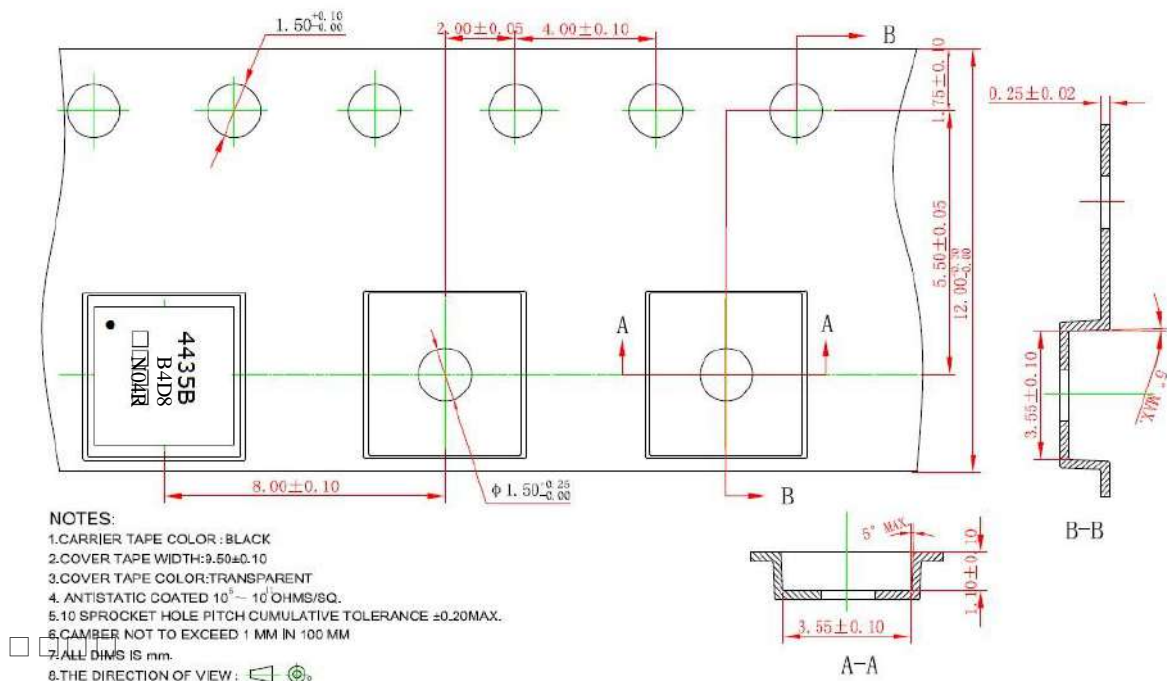


unit : mm

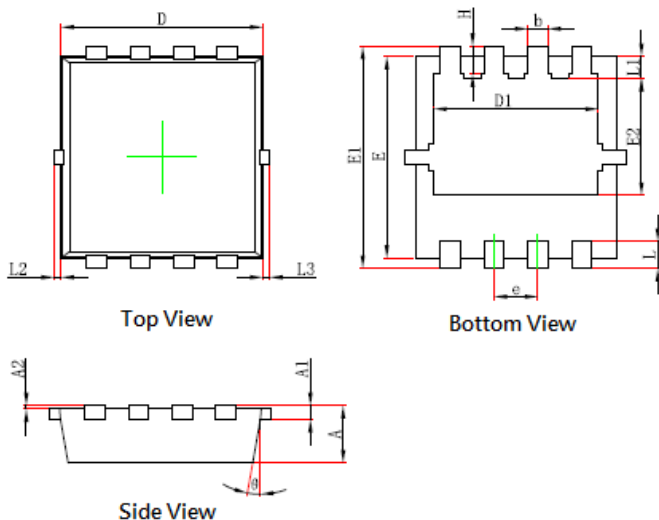
Reel Dimension



Carrier Tape Dimension

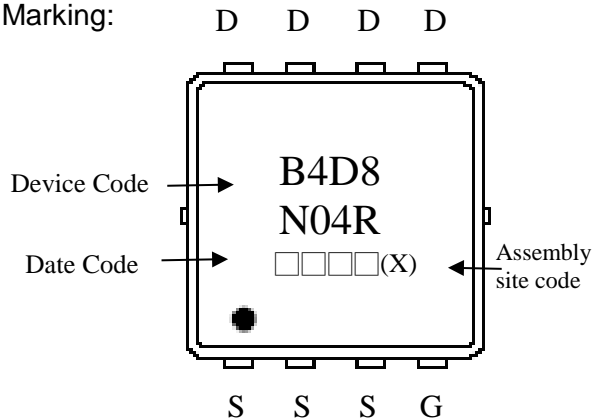


DFN3x3 Dimension



8-Lead DFN3x3 Plastic Package

Marking:



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
 Assembly site code : blank→ site 1, G →site 2

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.650	0.850	0.026	0.033	b	0.200	0.400	0.008	0.016
A1	0.152 REF		0.006 REF		e	0.550	0.750	0.022	0.030
A2	0.000	0.050	0.000	0.002	L	0.300	0.500	0.012	0.020
D	2.900	3.100	0.114	0.122	L1	0.180	0.480	0.007	0.019
D1	2.300	2.600	0.091	0.102	L2	0.000	0.100	0.000	0.004
E	2.900	3.100	0.114	0.122	L3	0.000	0.100	0.000	0.004
E1	3.150	3.450	0.124	0.136	H	0.315	0.515	0.012	0.020
E2	1.535	1.935	0.060	0.076	θ	9°	13°	9°	13°