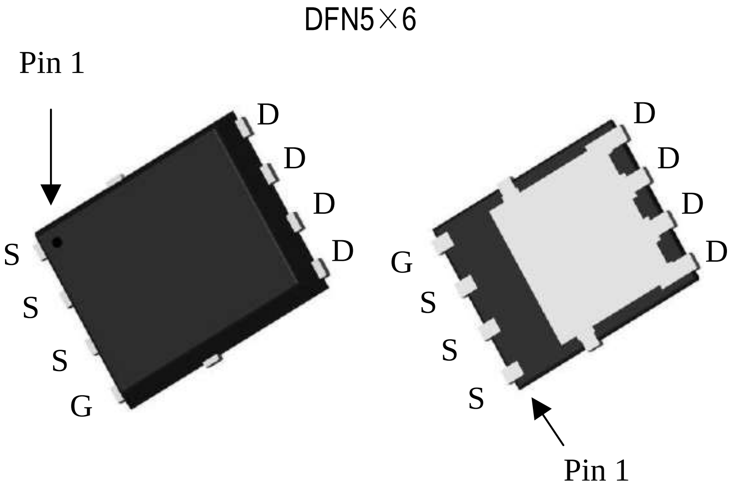
N-Channel Enhancement Mode Power MOSFET

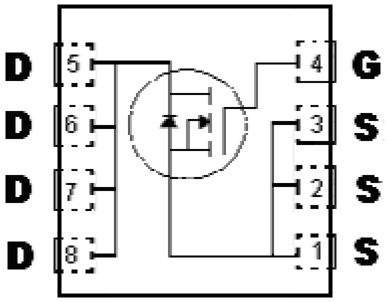


Features

- Single Drive Requirement
- Low On-resistance
- Fast Switching Characteristic
- Repetitive Avalanche Rated
- Pb-free lead plating and Halogen-free package

BV_{DSS}		150V
$I_D@V_{GS}$=10V, T_C=25°C		36A
$I_D@V_{GS}$=10V, T_A=25°C		8A
$R_{DSON(TYP)}$	V_{GS}=10V, I_D=20A	13.5mΩ
	V_{GS}=4.5V, I_D=15A	15.8mΩ

KPRB014N15R



G: Gate D: Drain S: Source

Ordering Information

Device	Package	Shipping
KPRB014N15R	DFN 5 ×6 (Pb-free lead plating and halogen-free package)	3000 pcs / tape & reel

Absolute Maximum Ratings (Ta=25°C)

Parameter		Symbol	10s	Steady State	Unit
Drain-Source Voltage		V_{DS}	150		V
Gate-Source Voltage		V_{GS}	±20		
Continuous Drain Current @ T_C=25°C, V_{GS}=10V (Note 1)		I_D	36		A
Continuous Drain Current @ T_C=100°C, V_{GS}=10V (Note 1)			22.8		
Continuous Drain Current @ T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	12	8	
Continuous Drain Current @ T_A=70°C, V_{GS}=10V (Note 2)			9.6	6.4	
Continuous Drain Current @ T_A=85°C, V_{GS}=10V (Note 2)			8.7	5.8	
Pulsed Drain Current (Note 3)		I_{DM}	120 *1		
Avalanche Current @ L=0.1mH (Note 3)		I_{AS}	80		
Avalanche Energy @ L=1mH, I_D=35A, V_{DD}=25V (Note 4)		E_{AS}	612		mJ
Repetitive Avalanche Energy @ L=0.05mH (Note 3)		E_{AR}	5 *2		
Total Power Dissipation	T_C=25℃ (Note 1)	P_D	50		W
	T_C=100℃ (Note 1)		20		
	T_A=25°C (Note 2)	P_{DSM}	5.7	2.5	
	T_A=70°C (Note 2)		4.0	1.8	
	T_A=85°C (Note 2)		3.6	1.6	
Operating Junction and Storage Temperature Range		Tj, Tstg	-55~+150		°C

Thermal Data

Parameter		Symbol	Typical	Maximum	Unit
Thermal Resistance, Junction-to-ambient (Note 2)	t≤10s	$R_{\theta JA}$	18	22	°C/W
	Steady State		42	50	
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	2.2	2.5	

Note : 1.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.

2. 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_{DSM} 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.
3. 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°C.
4. 100% tested by conditions of L=0.1mH, I_{AS}=20A, V_{GS}=10V, V_{DD}=25V

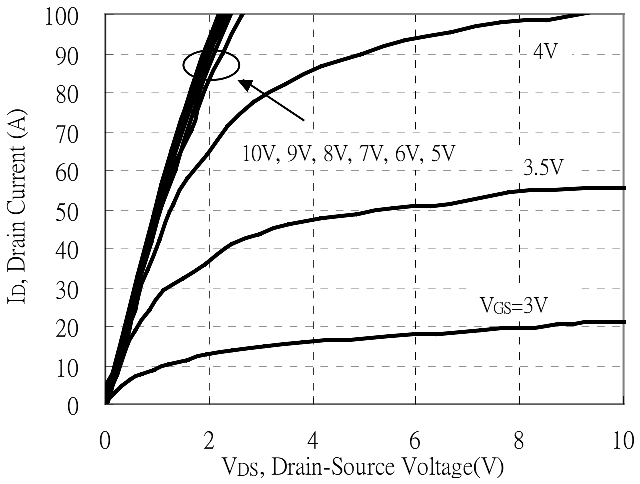
Characteristics (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	150	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	1	-	2.5		V_{DS} = V_{GS}, I_D=250μA
G_{FS} *1	-	27.5	-	S	V_{DS} =15V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS} =120V, V_{GS} =0V
	-	-	25		V_{DS} =120V, V_{GS} =0V, Tj=125°C
$R_{DS(ON)}$ *1	-	13.5	18	m Ω	V_{GS} =10V, I_D=20A
		15.8	23		V_{GS} =4.5V, I_D=15A
Dynamic					
Ciss	-	4300	-	pF	V_{GS}=0V, V_{DS}=80V, f=1MHz
Coss	-	374	-		
Crss	-	15.7	-		
Qg *1, 2	-	71.4	-	nC	V_{DS}=75V, V_{GS}=10V, I_D=20A
Qgs *1, 2	-	12.4	-		
Qgd *1, 2	-	15.7	-		
$t_{d(ON)}$ *1, 2	-	25	-	ns	V_{DD}=75V, I_D=20A, V_{GS}=10V, R_G=1 Ω
tr *1, 2	-	25.1	-		
$t_{d(OFF)}$ *1, 2	-	78	-		
t_f *1, 2	-	13.2	-		
Rg	-	1.2	-	Ω	f=1MHz
Source-Drain Diode					
I_S *1	-	-	36	A	
I_{SM} *3	-	-	120		
V_{SD} *1	-	0.78	1.2	V	I_S=10A, V_{GS}=0V
trr	-	71.5	-	ns	I_F=10A, dI_F/dt=100A/μs
Qrr	-	207	-	nC	

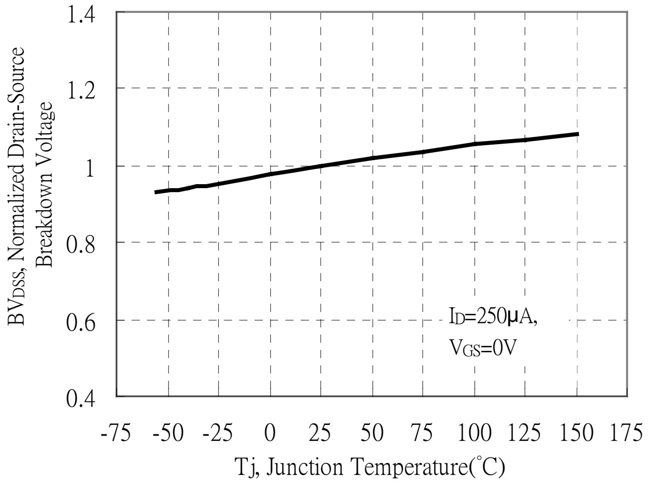
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%
*2.Independent of operating temperature
*3.Pulse width limited by maximum junction temperature.

Typical Characteristics

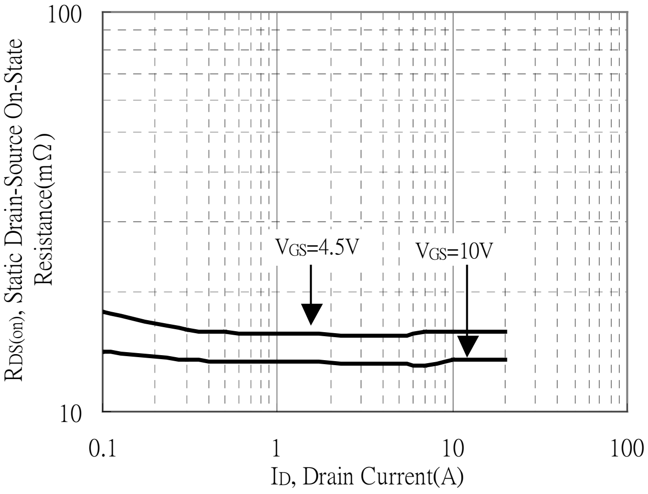
Typical Output Characteristics



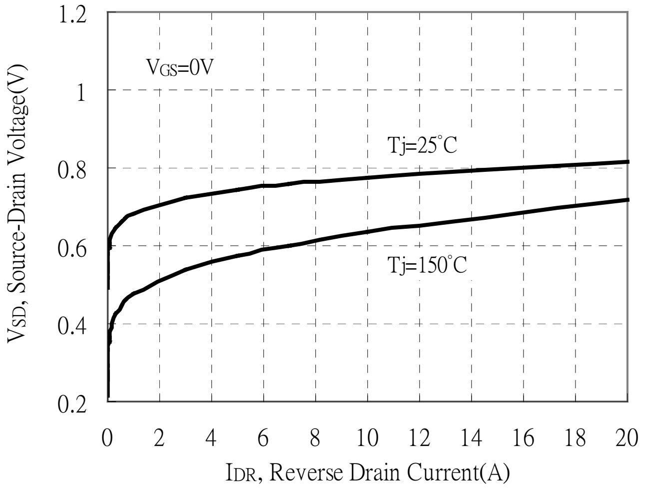
Brekdown Voltage vs Ambient Temperature



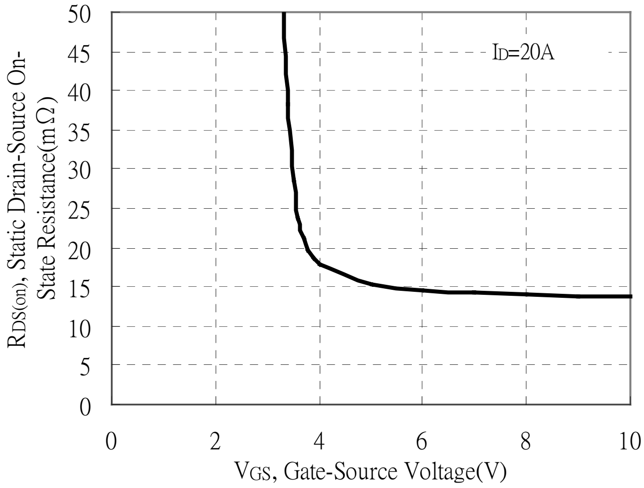
Static Drain-Source On-State resistance vs Drain Current



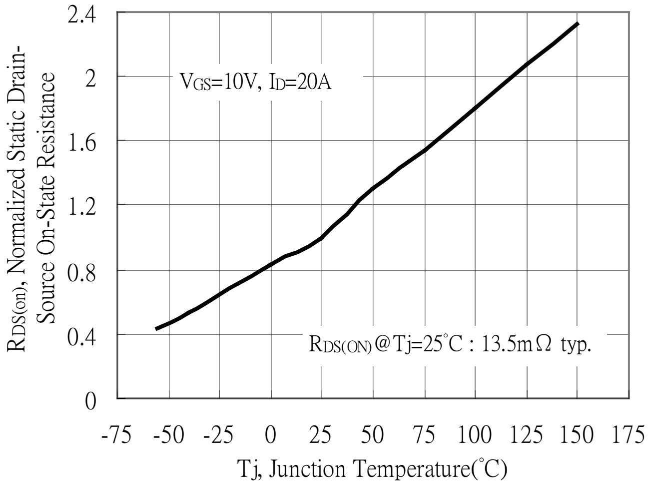
Reverse Drain Current vs Source-Drain Voltage



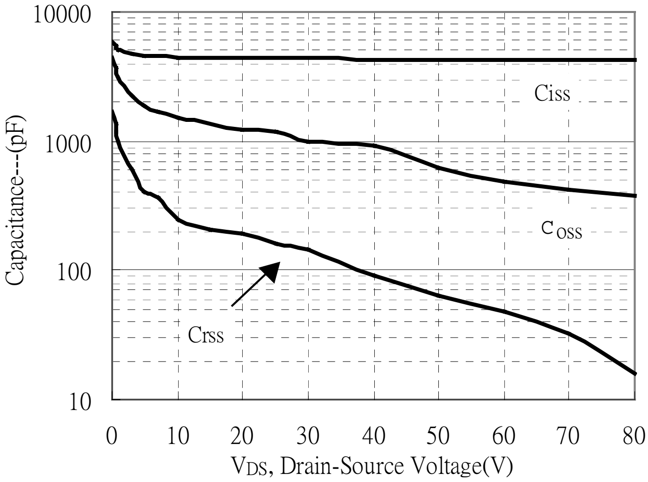
Static Drain-Source On-State Resistance vs Gate-Source Voltage

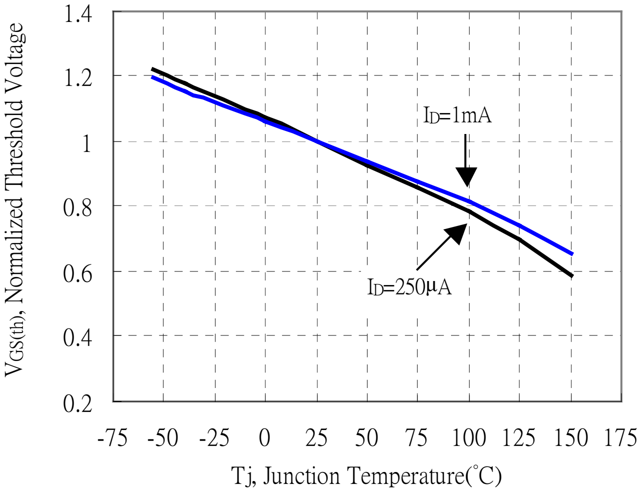


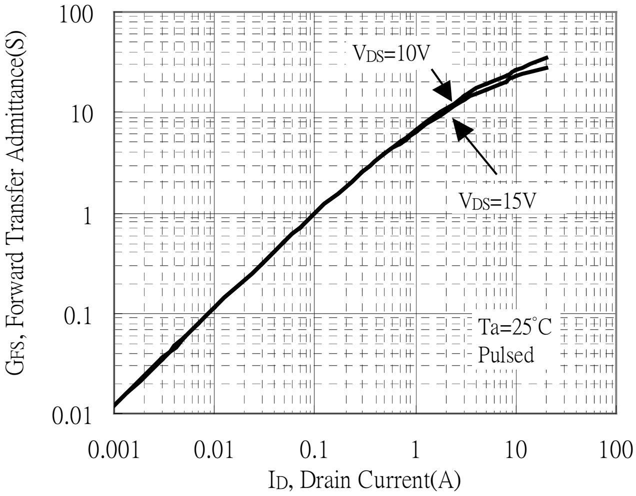
Drain-Source On-State Resistance vs Junction Tempearture

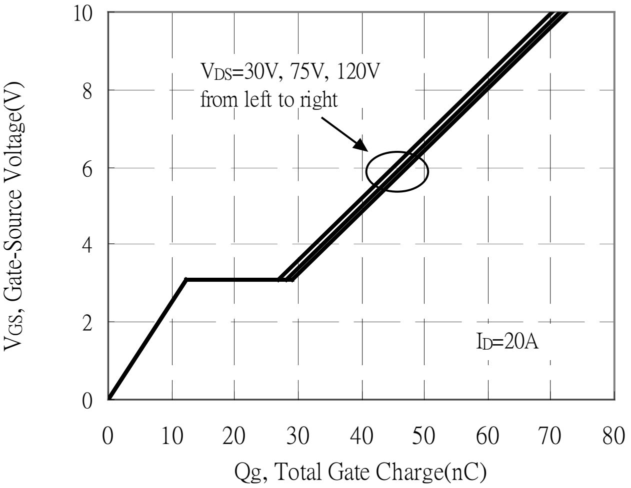


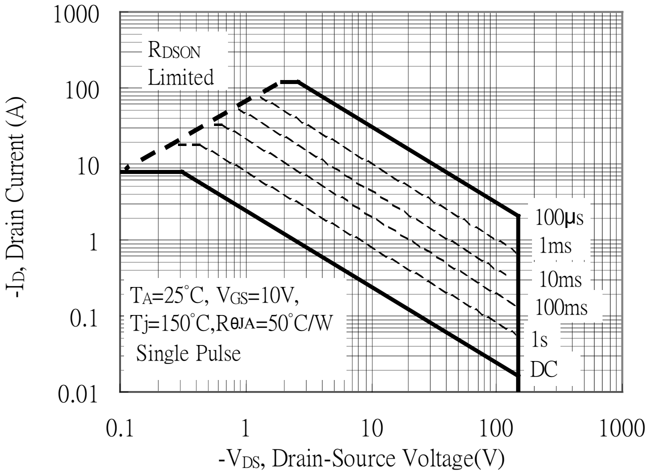
Typical Characteristics(Cont.)

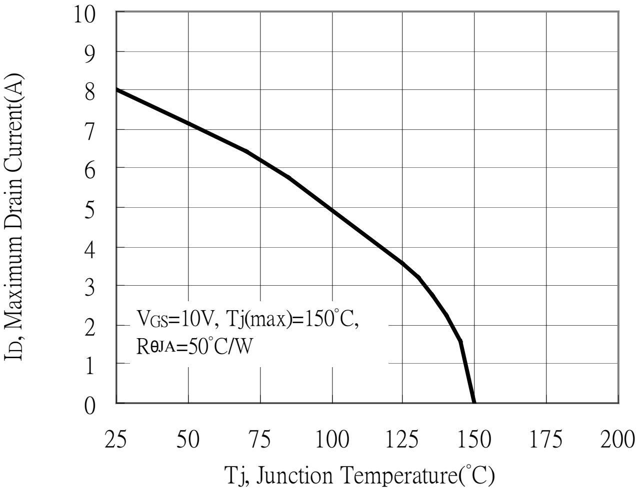

Capacitance vs Drain-to-Source Voltage


Threshold Voltage vs Junction Tempearture

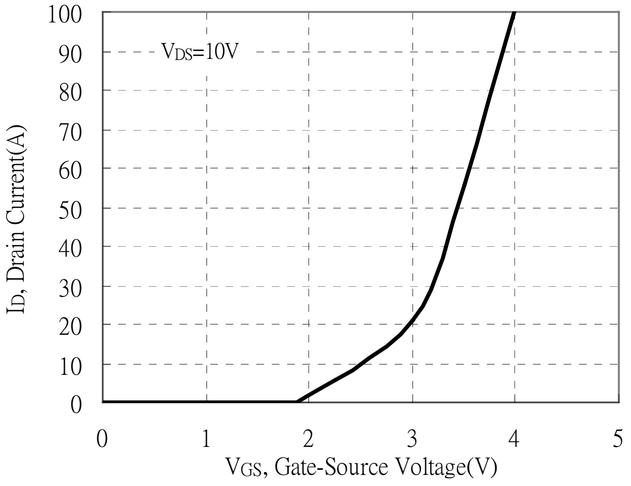

Forward Transfer Admittance vs Drain Current

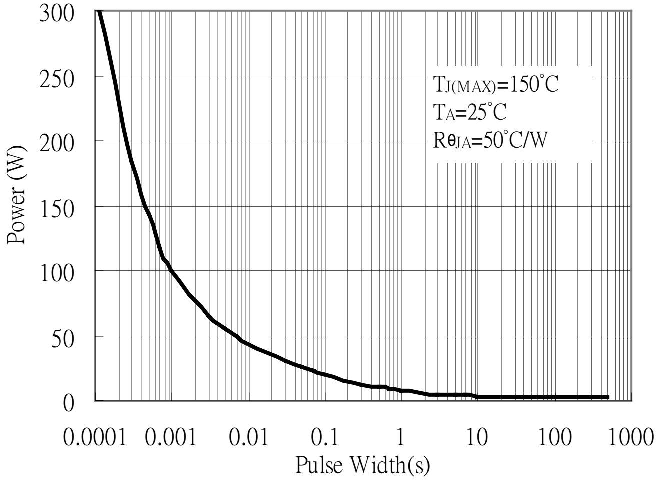

Gate Charge Characteristics

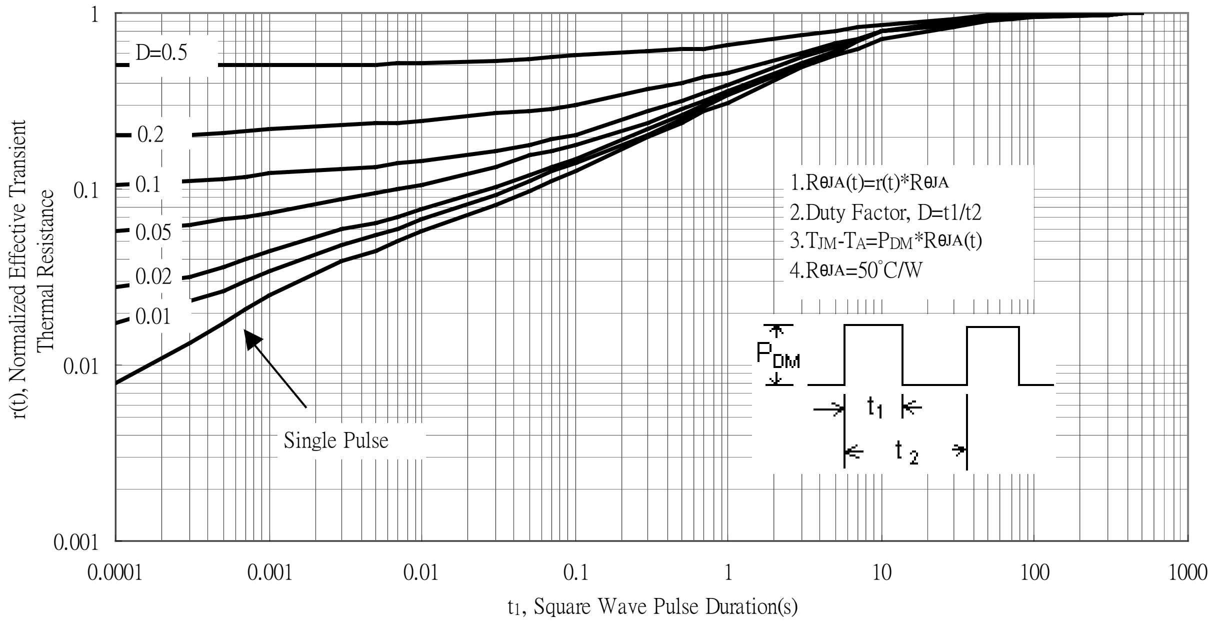

Maximum Safe Operating Area


Maximum Drain Current vs Junction Temperature

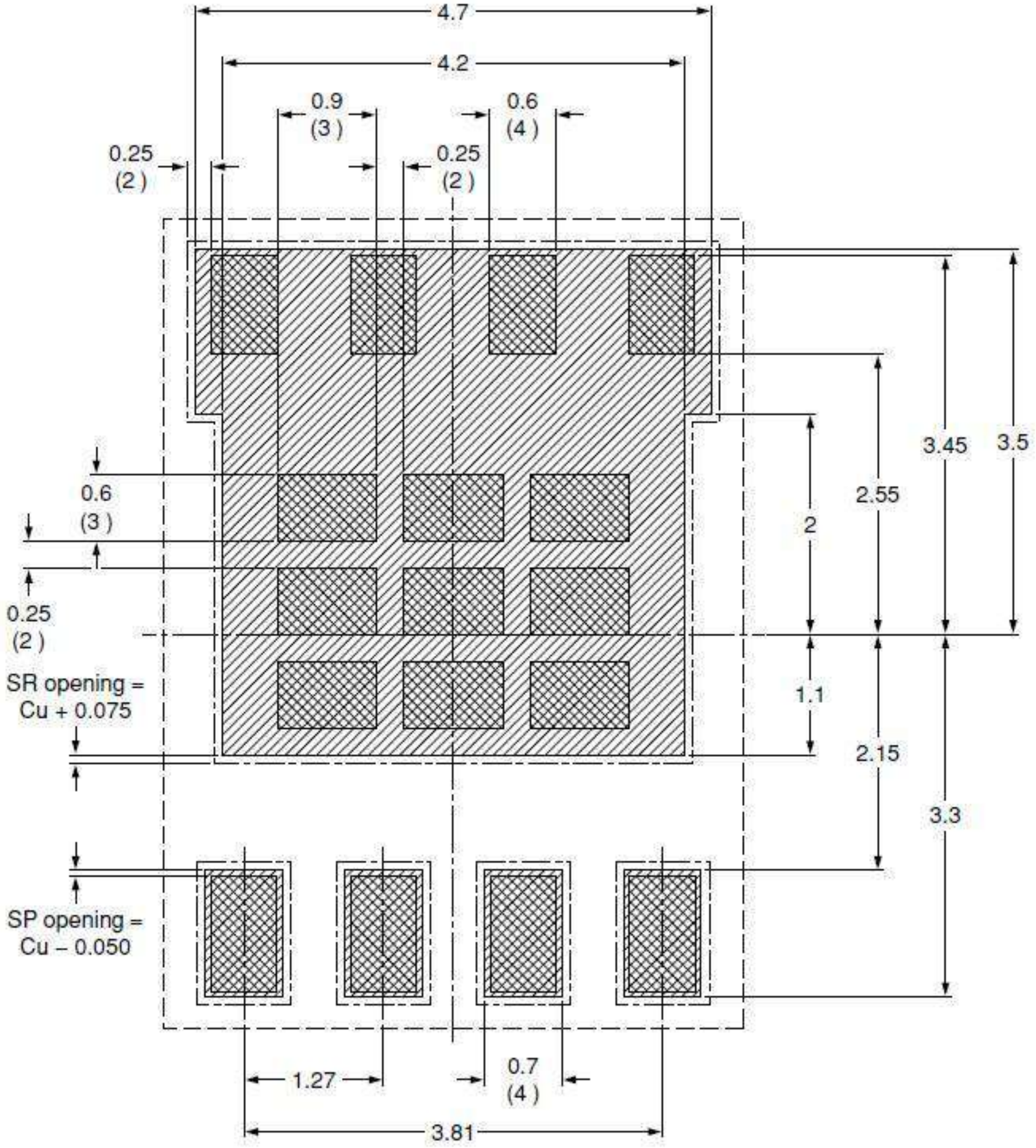
Typical Characteristics(Cont.)


Typical Transfer Characteristics


Single Pulse Maximum Power Dissipation, Nunction to Ambient


Transient Thermal Response Curves

Recommended Soldering Footprint & Stencil Design



▨ solder lands

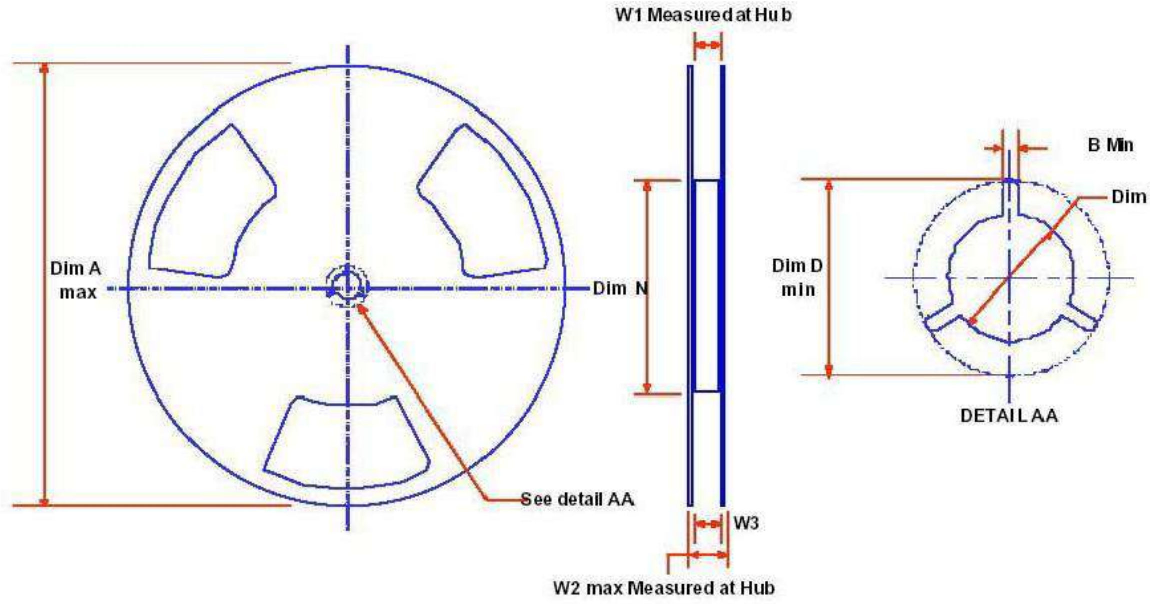
▩ solder paste
125 μm stencil

⌐ solder resist

⌐ occupied area

unit : mm

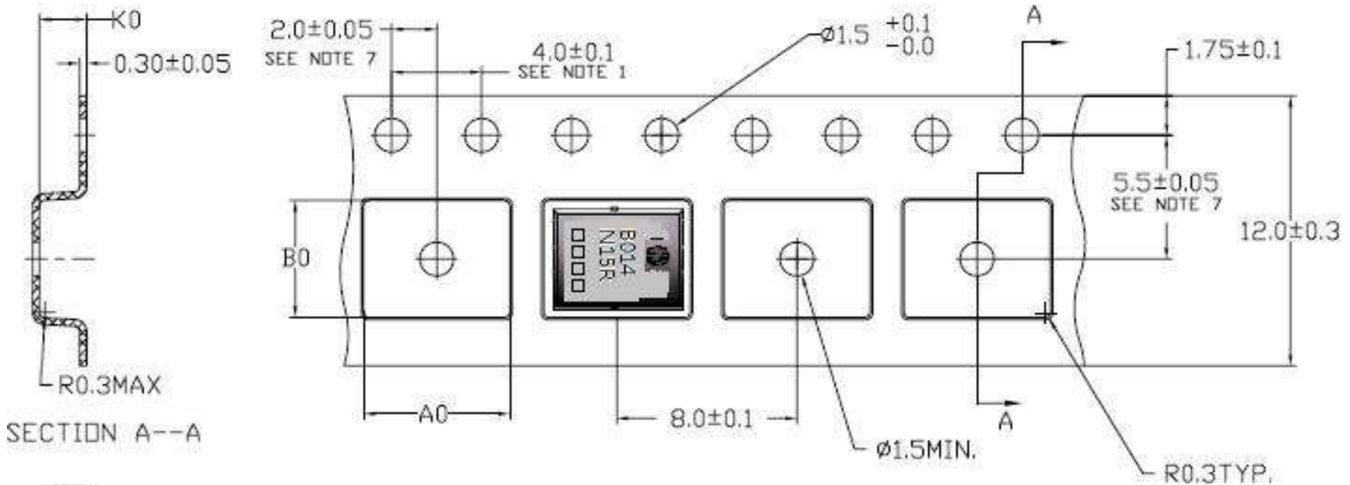
Reel Dimension



Dimensions are in inches and millimeters

Tape Size	Reel Option	Dim A	Dim B	Dim C	Dim D	Dim N	Dim W1	Dim W2	Dim W3 (LSL-USL)
12mm	13" Dia (STD/L99Z)	13.00 330+/-1	0.059 1.5 Min.	0.512 13.0 Min.	0.795 20.2(ref.)	7.00 178+0/-2	0.488 +0.078/-0.000 12.4 +2/0	0.724 18.4(ref.)	0.469 – 0.606 11.9 – 15.4

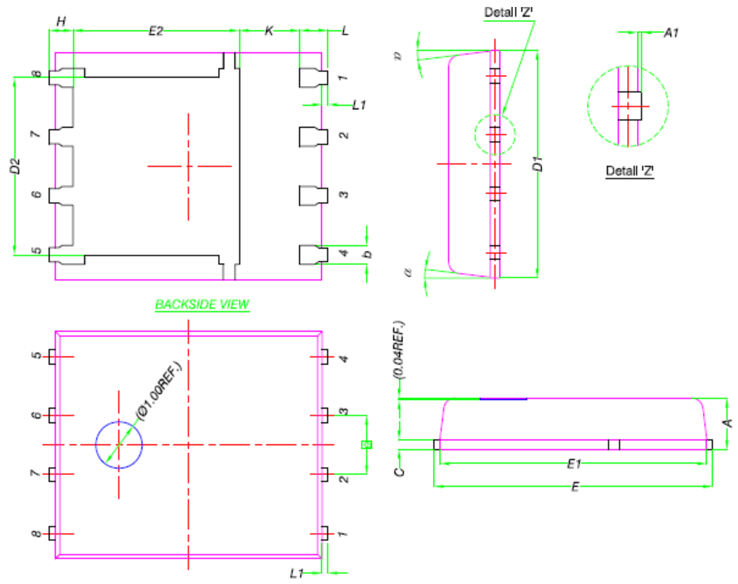
Carrier Tape Dimension

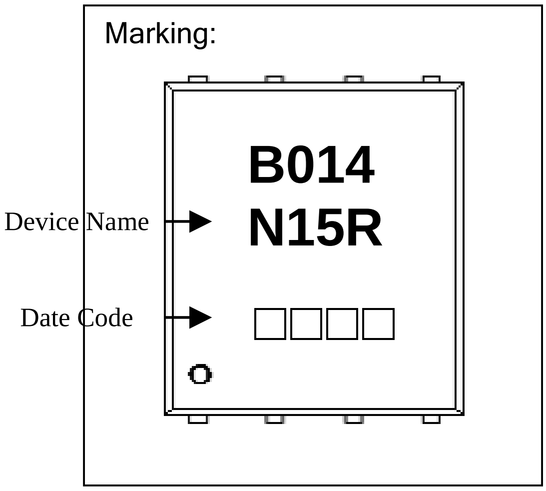


NOTE:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2
2. CAMBER NOT TO EXCEED 1mm IN 100mm, NONCUMULATIVE OVER 250mm.
3. MATERIAL: BLACK STATIC DISSIPATIVE PS.(POLYSTYRENE)
4. ALL DIMENSIONS ARE IN MILLIMETERS (UNLESS OTHERWISE SPECIFIED)
5. A0 AND B0 MEASURED ON A PLANE 0.3mm ABOVE THE BOTTOM OF THE POCKET
6. K0 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 POCKET, NOT POCKET HOLE
8. SURFACE RESISTIVITY
   1X10E4~1X10E11 OHMS/SQ)
   1X10E4~1X10E6 OHMS/SQ. for Fairchild Only

A0=6.5±0.1
B0=5.3±0.1
K0=1.4±0.1

DFN5×6 Dimension





8-Lead DFN5×6 Plastic Package

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.90	1.10	0.035	0.043	E2	3.38	3.78	0.133	0.149
A1	0.00	0.05	0.000	0.002	e	1.27 BSC		0.050 BSC	
b	0.33	0.51	0.013	0.020	H	0.41	0.61	0.016	0.024
C	0.20	0.30	0.008	0.012	K	1.10	-	0.043	-
D1	4.80	5.00	0.189	0.197	L	0.51	0.71	0.020	0.028
D2	3.61	3.96	0.142	0.156	L1	0.06	0.20	0.002	0.008
E	5.90	6.10	0.232	0.240	θ	8°	12°	8°	12°
E1	5.70	5.80	0.224	0.228					