

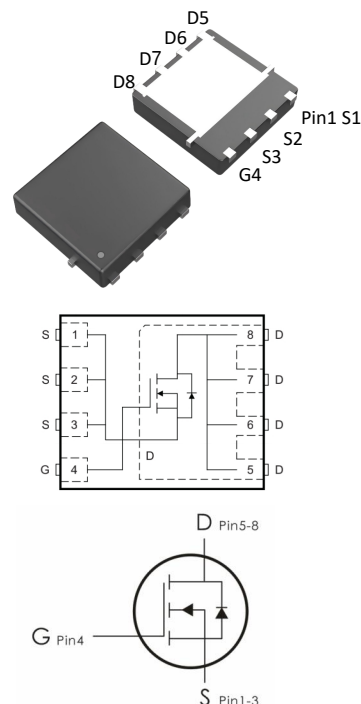
Description:

This N-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.

Features:

- 1) $V_{DS}=20V, I_D=45A, R_{DS(ON)} < 5.5m\Omega @ V_{GS}=4.5V$ (Typ: $4.2m\Omega$)
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low $R_{DS(ON)}$.
- 5) Excellent package for good heat dissipation.
- 6) MSL3



Package Marking and Ordering Information:

Part NO.	Marking	Package	Packing
ZB5R5NAG-K	B5R5NA-K	DFN3*3-8	5000 pcs/Reel

Absolute Maximum Ratings: ($T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	20	V
V_{GS}	Gate-Source Voltage	± 12	V
I_D	Continuous Drain Current- $T_C=25^\circ C^1$	45	A
	Continuous Drain Current- $T_C=100^\circ C^1$	31	
I_{DM}	Drain Current – Pulsed ²	180	A
P_D	Power Dissipation - $T_A=25^\circ C$	23	W
E_{AS}	Single pulse avalanche energy ³	49	mJ
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ C$

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	5.5	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62	$^\circ C/W$

Electrical Characteristics: ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250 μ A	20	---	---	V
I _{DSS}	Drain-Source Leakage Current	V _{GS} =0V, V _{DS} =40V	---	---	1	μ A
I _{GSS}	Gate-Source Leakage Current	V _{GS} =± 12V, V _{DS} =0A	---	---	± 100	nA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} =V _{DS} , I _D =250 μ A	0.5	0.7	1	V
R _{DS(ON)}	Drain-Source On Resistance ⁴	V _{GS} =4.5V, I _D =10A	---	4.2	5.5	m Ω
		V _{GS} =2.5V, I _D =5A	---	5.9	7.5	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=500KHz	---	1862	---	pF
C _{oss}	Output Capacitance		---	267	---	
C _{rss}	Reverse Transfer Capacitance		---	253	---	
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DD} =16V , V _{GS} =4.5V , R _G =1.5 Ω , I _D =32A	---	13	---	ns
t _r	Rise Time		---	48	---	ns
t _{d(off)}	Turn-Off Delay Time		---	57.7	---	ns
t _f	Fall Time		---	89	---	ns
Q _g	Total Gate Charge	V _{DS} =16V , V _{GS} =4.5V , I _D =32A	---	25	---	nC
Q _{gs}	Gate-Source Charge		---	4	---	nC
Q _{gd}	Gate-Drain “Miller” Charge		---	12	---	nC
Drain-Source Diode Characteristics						
I _S	Continuous Drain Curren	V _D =V _G =0V	---	---	40.9	A
I _{SM}	Pulsed Drain Current		---	---	163.6	A
V _{SD}	Source-Drain Diode Forward Voltage	V _{GS} =0V , I _F =20A	---	0.86	1.1	V
T _{rr}	Reverse Recovery Time	I _F =32A, T _J =25 °C	---	43	---	ns
Q _{rr}	Reverse Recovery C45rge	dI/dt=39A/us	---	0.03	---	μ C

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : $T_J=25^{\circ}C, V_{DD}=10V, V_G=4.5V, L=0.5mH$
4. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Characteristics: ($T_C=25^{\circ}C$ unless otherwise noted)

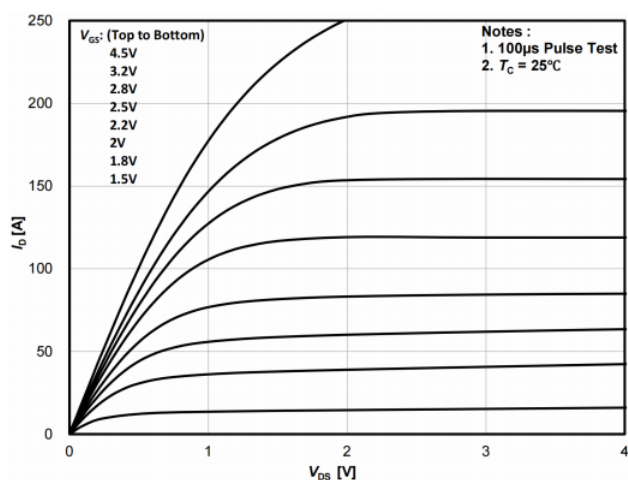


Figure 1. On-Region Characteristics

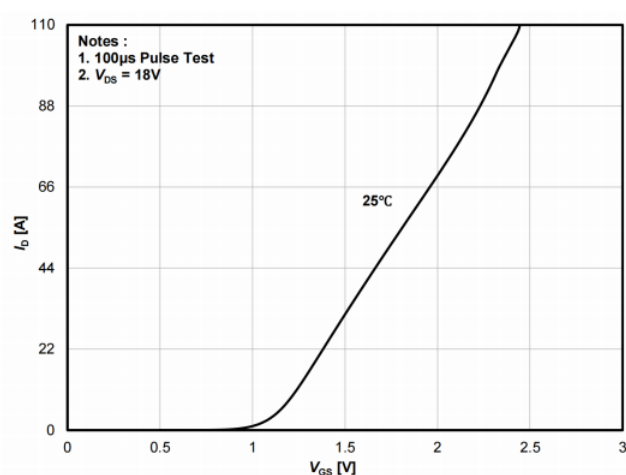


Figure 2. Transfer Characteristics

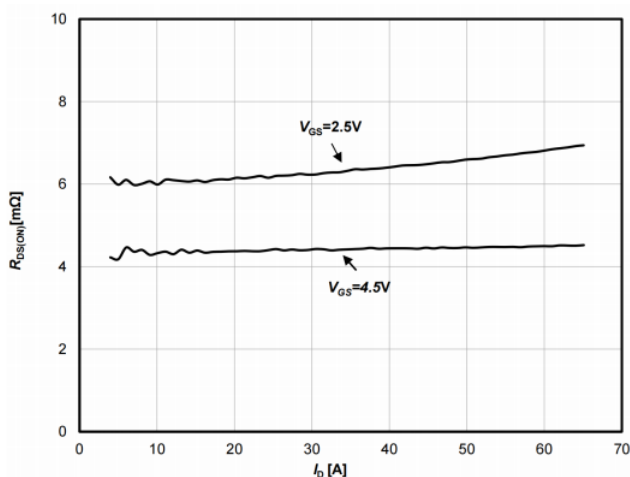


Figure 3. On Resistance vs. Drain Current

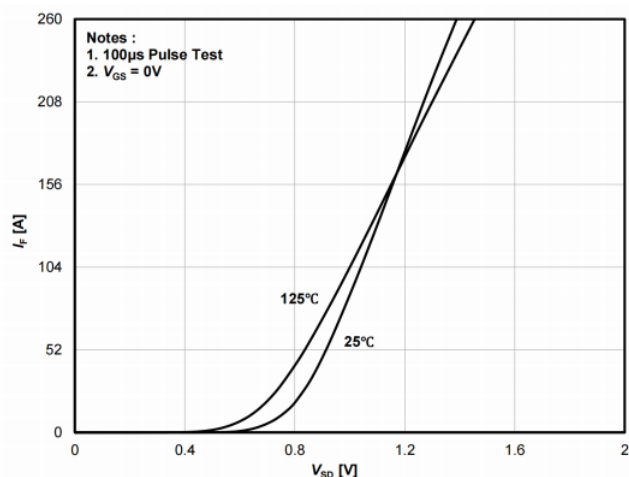


Figure 4. Diode Forward Voltage vs. Current

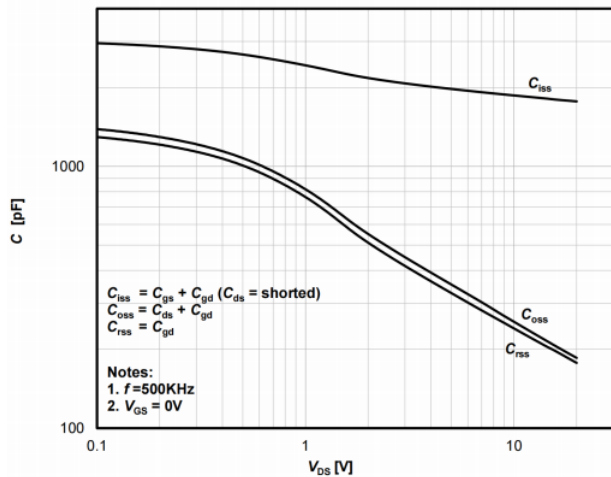


Figure 5. Capacitance Characteristics

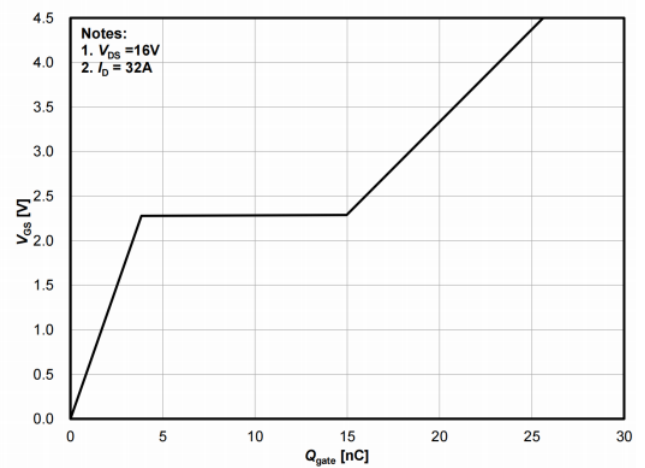


Figure 6. Gate Charge Characteristics

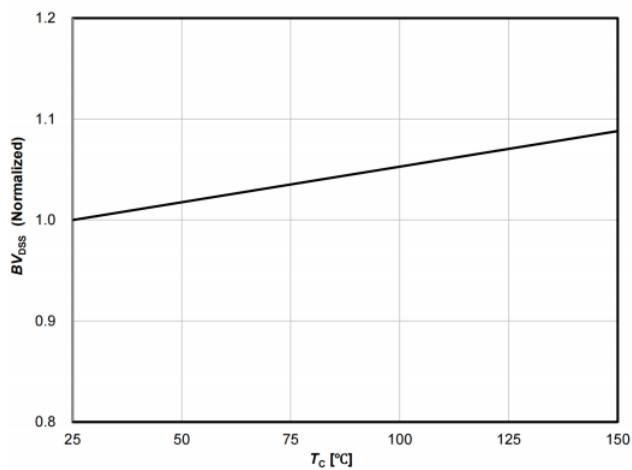


Figure 7. Normalized BV_{DS} vs. Temperature

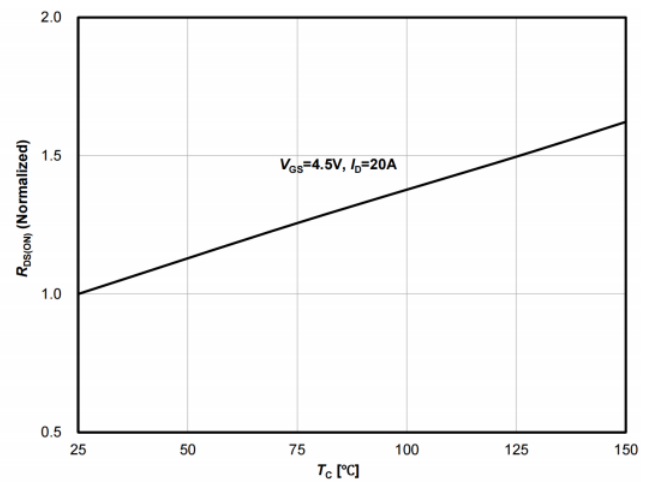


Figure 8. Normalized On-Resistance Variation vs. Temperature

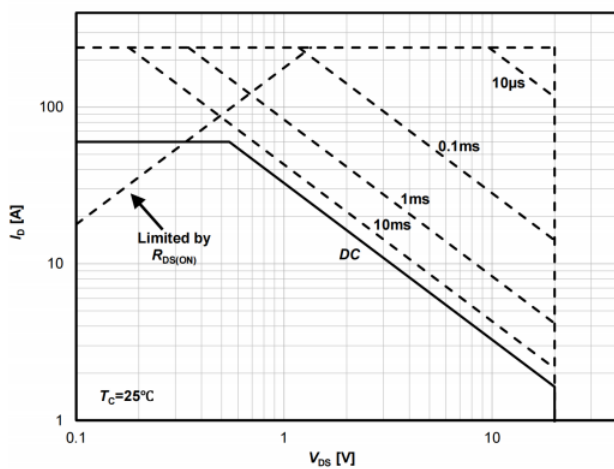


Figure 9. Safe Operating Area ³⁾

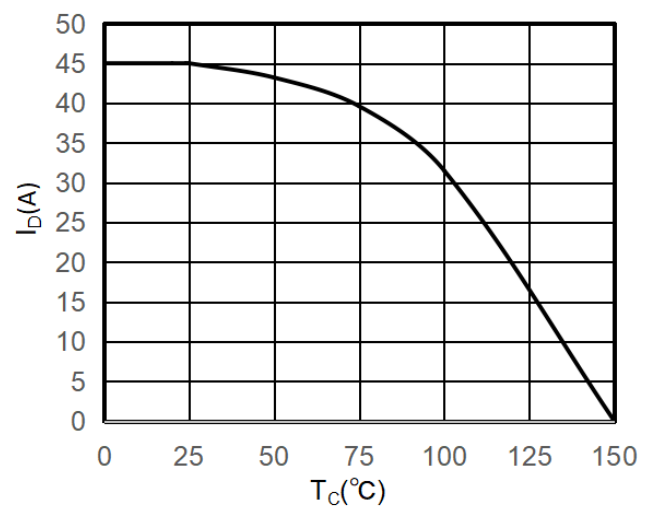


Figure 10. Drain Current vs. Temperature

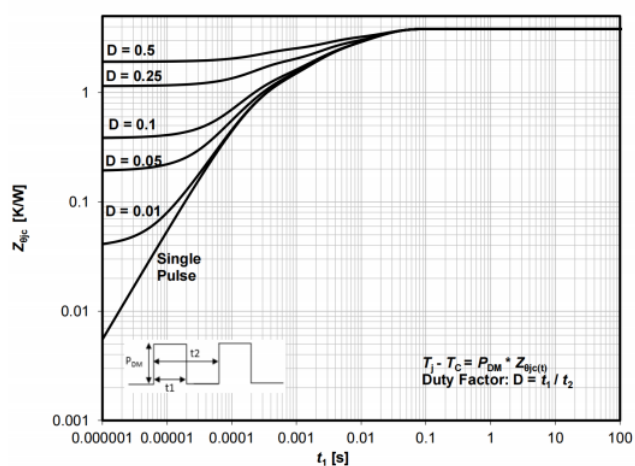
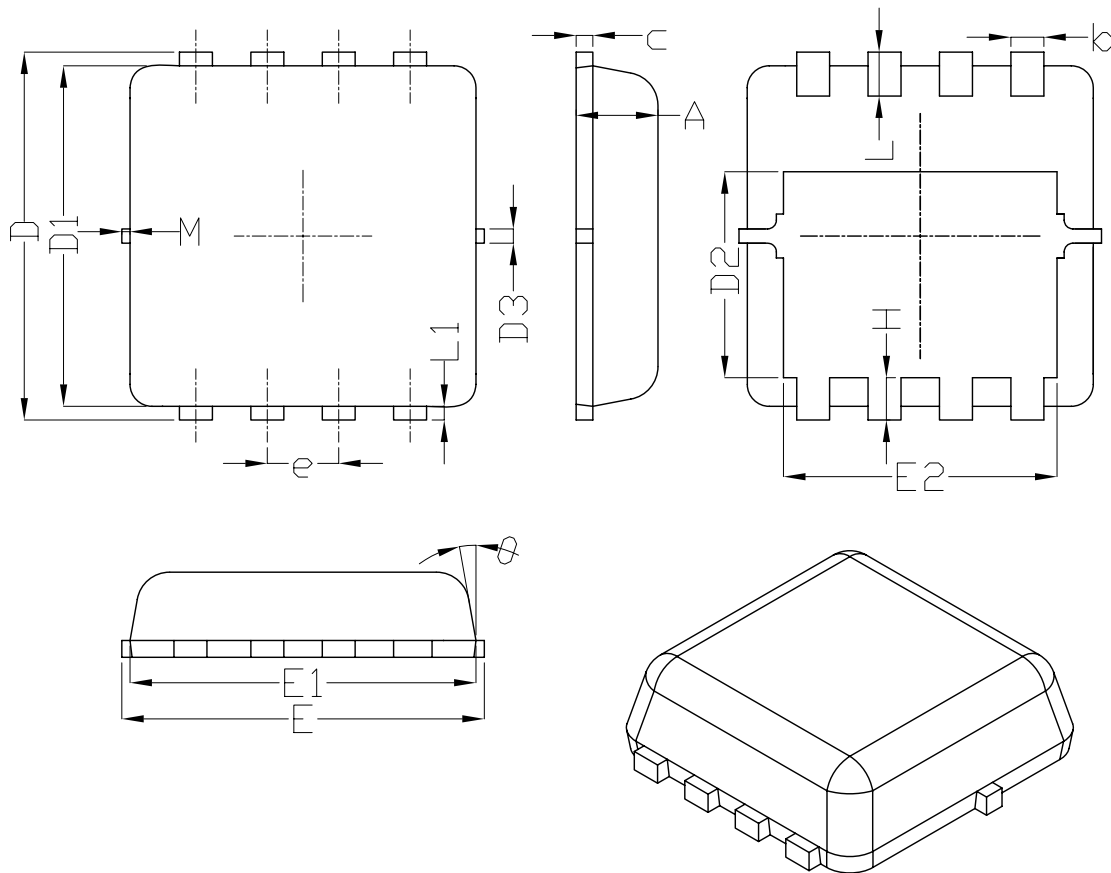
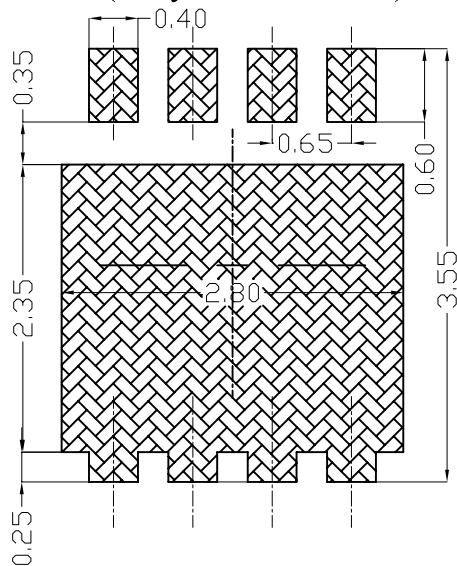


Figure 11. Transient Thermal Impedance

DFN3X3-8 Package Outline Data



**Land Pattern
(Only for Reference)**



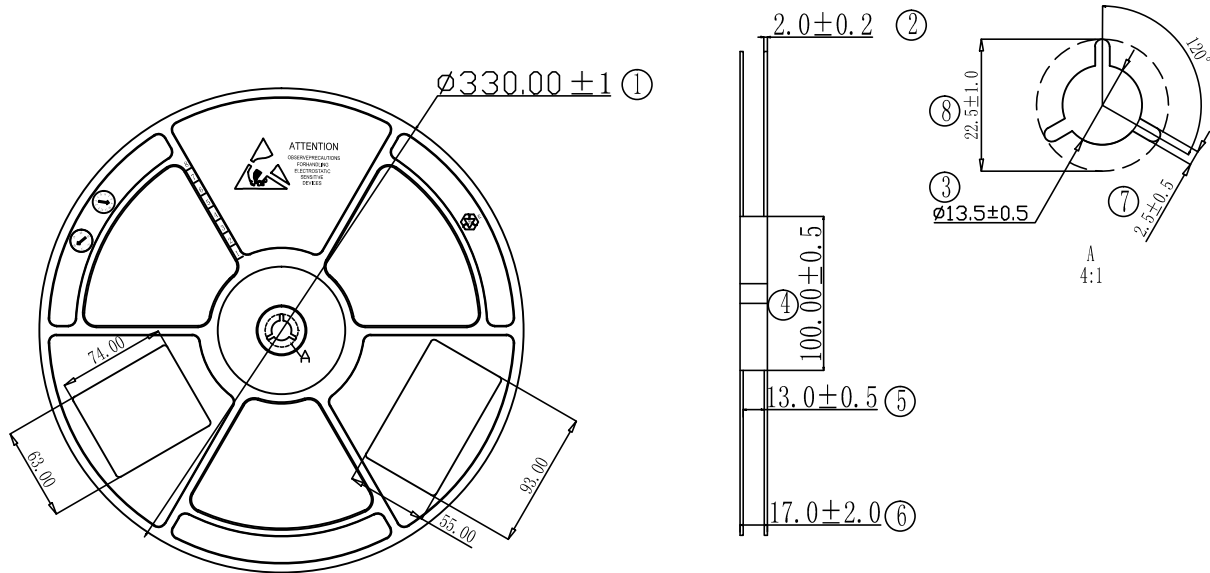
UNIT: mm

SYMBOL	DIMENSIONAL REQMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
θ	---	10°	12°
M	*	*	0.15

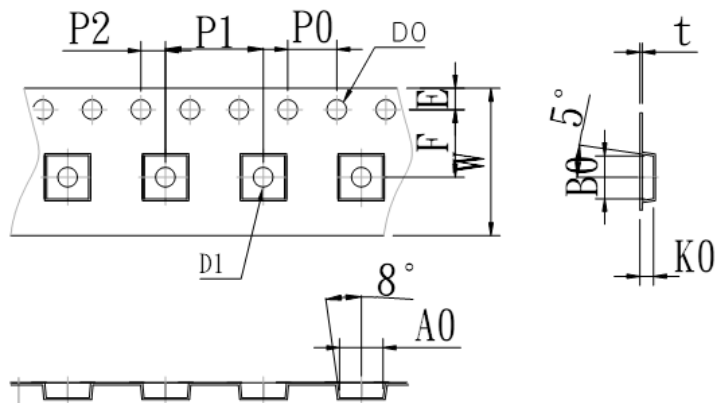
* Not specified

Tape & Reel Information

Dimensions in mm



Symbol	A0	B0	K0	D0	D1	P0	P1	10*P0
Spec	3.55 $\pm$ 0.10	3.45 $\pm$ 0.10	1.13 $\pm$ 0.10	1.55 $\pm$ 0.10	1.55 $\pm$ 0.10	4.00 $\pm$ 0.10	8.00 $\pm$ 0.10	40.0 $\pm$ 0.10
Symbol	W	E	F	P2	t			
Spec	12.00 $\pm$ 0.10	1.75 $\pm$ 0.10	5.50 $\pm$ 0.10	2.00 $\pm$ 0.10	0.20 $\pm$ 0.05			



Pulling direction →

Marking Information:

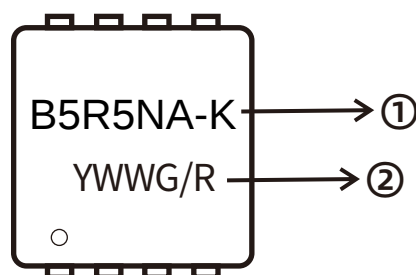
①. Part NO.

②. Date Code(YWWG / R)

Y : Year Code , last digit of the year

WW : Week Code(01-53)

G/R : G(Green) /R(Lead Free)



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-11-22	Release of final version

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