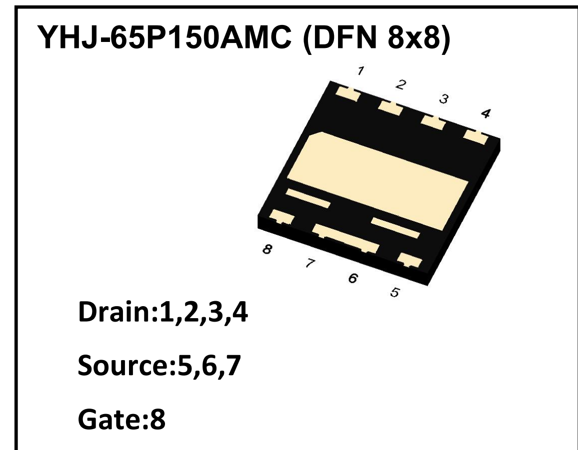
YHJ-65P150AMC: DFN 8x8 Cascode GaN HEMT

Description

YHJ-65P150AMC is a normally-off GaN High electron mobility transistor (HEMT) device using the cascode configuration, which provides high breakdown voltage,high current and high operating speed which is suitable for high power applications.



Key Specifications

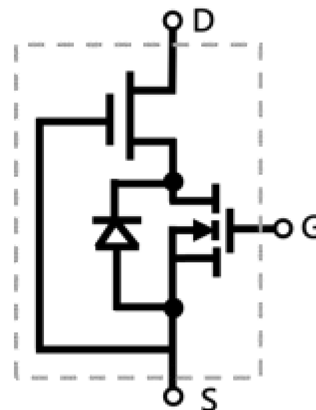
Part Number	YHJ-65P150AMC
V_{DSS}, min.	650V
$V_{(TR)\ DSS}$, min.	800V
$R_{DS(ON)}$, typ.	150mΩ
Q_G, typ.	10nC
Package	DFN 8 x 8 mm

Features

- Gate drive voltage compatibility (-20V to +20V)
- High operating frequency
- Low Qrr

Applications

- Switch Mode Power Supplies (SMPS)
- AC-DC/ DC-DC Converters
- Motor Drives



Cascode Device Structure

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1- Electrical Characteristics

➢ Table 1 Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{DSS}	Drain- source voltage		650	V
$V_{(TR)\ DSS}$	Transient drain to source voltage[a]		800	V
V_{GSS}	Gate- source voltage		-20V ~ +20V	V
I_D	Drain current (continuous) at T_C = 25°C operation		12	A
	Drain current (continuous) at T_C = 100°C operation		8	A
I_{DM}	Pulsed drain current (pulse width: 10μs)		21	A
T_c	Operating temperature	Case	-55 to +150	°C
T_J		Junction	-55 to +150	°C
T_S	Storage temperature		-55 to +150	°C
T_{SOLD}	Soldering peak temperature[b]		260	°C

a. In off-state, spike duty cycle D<0.01, spike duration <1μs
b. For 10 sec., 1.6mm from the case

➢ Table 2 Thermal Characteristics

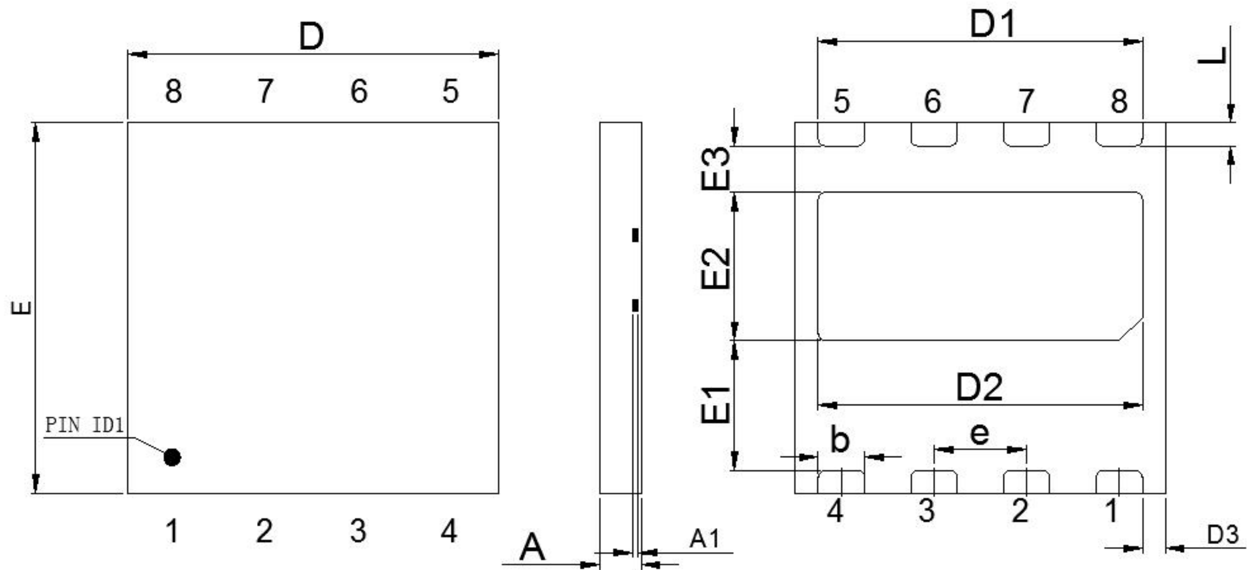
Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal resistance junction- ambient	54	°C/W
$R_{\theta JC}$	Thermal resistance junction- case	2.8	°C/W

Table 3 Electrical Characteristics (T_{CASE} = 25 °C unless otherwise stated)

Symbol	Parameter	Conditions	Values			Unit
			min.	typ.	max.	
$V_{(BL)DSS}$	Drain-source voltage	V_{GS}=0V	650	-	-	V
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= 10V , I_D=1mA		1.7	2.2	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS}=6V, I_D=5A, T_J=25 °C	-	150	185	mΩ
		V_{GS}=6V, I_D=5A, T_J=150 °C	-	302	-	
I_{DSS}	Drain-source leakage current	V_{GS} =0V, V_{DS} =650V, T_J=25°C	-	2.5	28	μA
		V_{GS} =0V, V_{DS} =650V, T_J =150°C	-	10	-	
I_{GSS}	Gate-to-source forward leakage current	V_{GS}=20V	-	-	100	nA
	Gate-to-source reverse leakage current	V_{GS}=-20V	-	-	-100	
C_{ISS}	Input capacitance	V_{GS}=0V, V_{DS}=400V, f=100k Hz		505	-	pF
C_{OSS}	Output capacitance		-	29	-	
C_{RSS}	Reverse transfer capacitance		-	1	-	
Q_G	Gate charge	V_{GS}=0~10V, V_{DS}=400V, I_{DS} =5A	-	10	-	nC
Q_{GS}	Gate-source charge		-	4.3	-	
Q_{OSS}	Output charge	V_{GS}=0V, V_{DS}=0~400V	-	36	-	nC
$t_{D(on)}$	Turn-on delay time	V_{DS}=400V, V_{GS}=0 to 10V, I_{DS}=2A , R_G=25Ω	-	9	-	ns
$t_{D(off)}$	Turn-off delay time		-	20	-	
Q_{RR}	Reverse recovery charge	I_S=5A, V_{DS} =400V	-	46	-	nC

2- Package Outline Dimensions

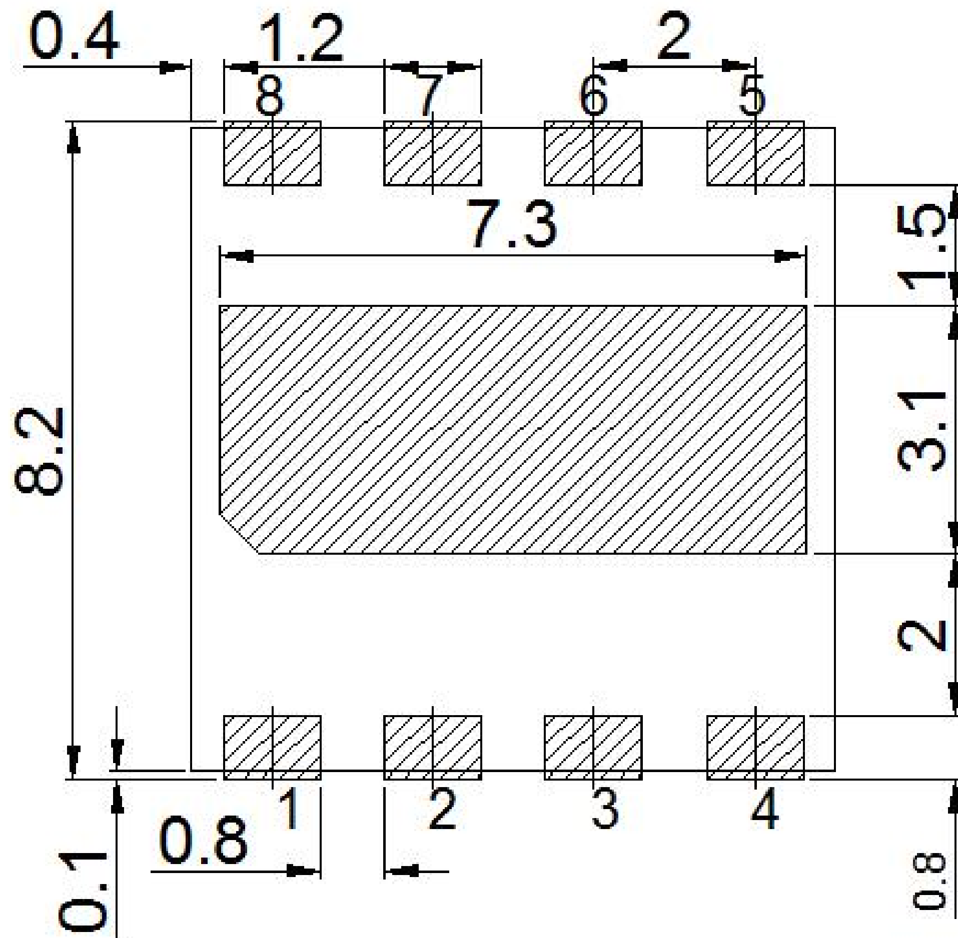
2-1 YHJ-65P150AMC (DFN 8x8)



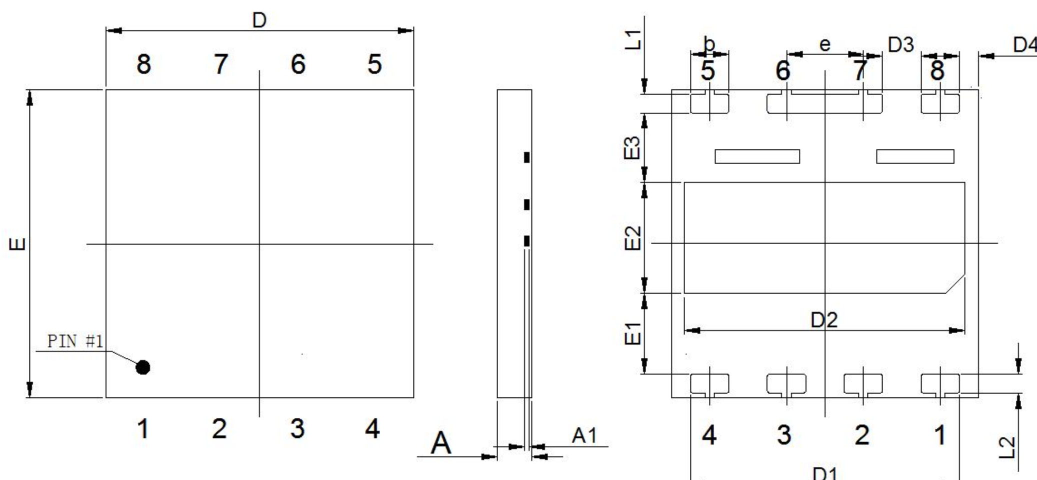
- **Table 4 Dimension of YHJ-65P150AMC**

Ref.	Dimensions(in mm)			Ref.	Dimensions(in mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.8	0.9	1	D3	0.4	0.5	0.6
A1	0	-	0.2	E1	2.7	2.8	2.9
b	0.9	1	1.1	E2	3.1	3.2	3.3
D	7.9	8	8.1	E3	0.9	1	1.1
E	7.9	8	8.1	e	2BSC		
D1	6.9	7	7.1	L	0.4	0.5	0.6
D2	6.9	7	7.1				

YHJ DFN-8X8 YHJ-65P150AMC Recommended PCB Soldering Footprint



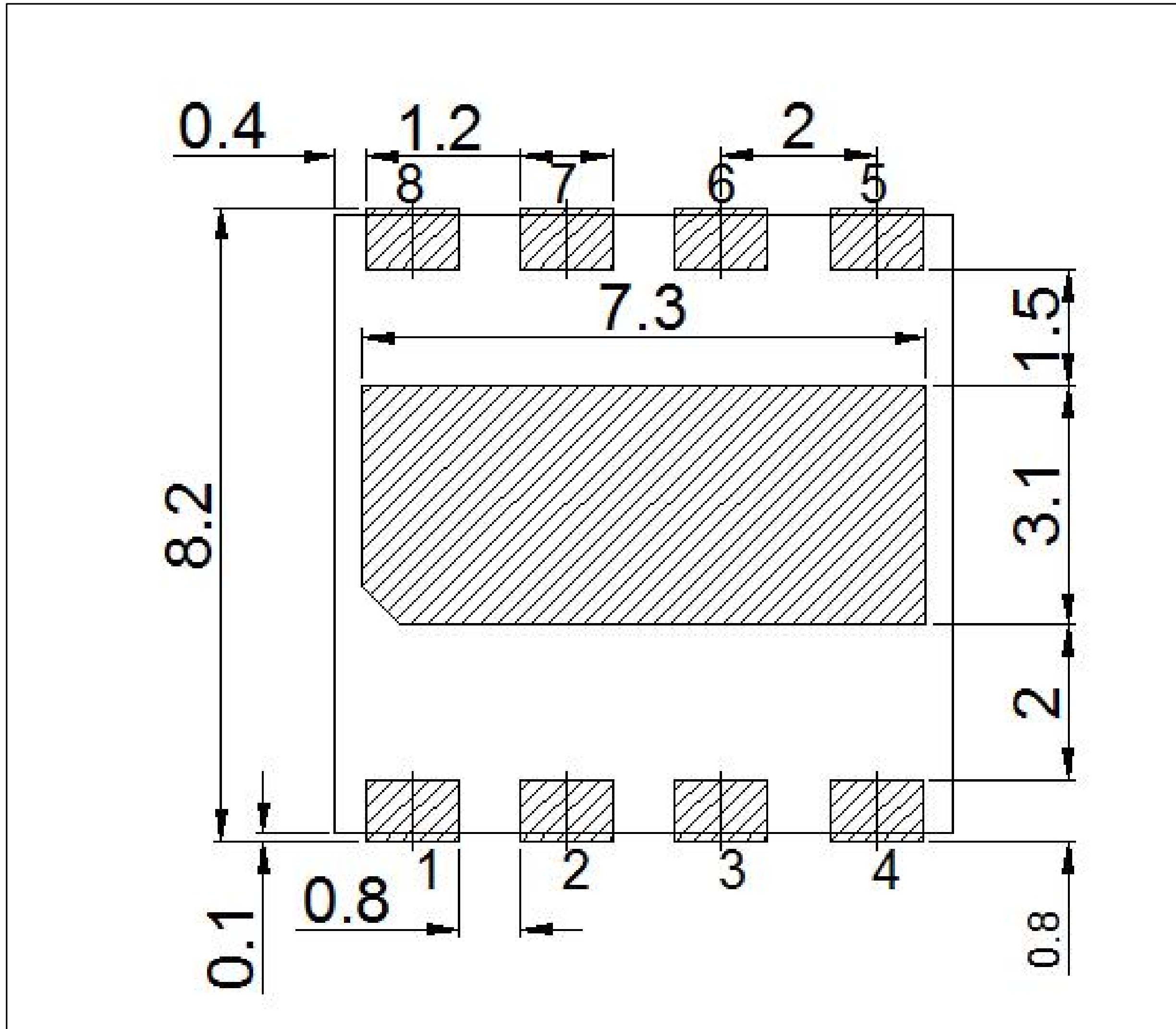
2-2 YHJ-65P150AMC (DFN 8x8)



➢ **Table 5 Dimension of YHJ-65P150AMC**

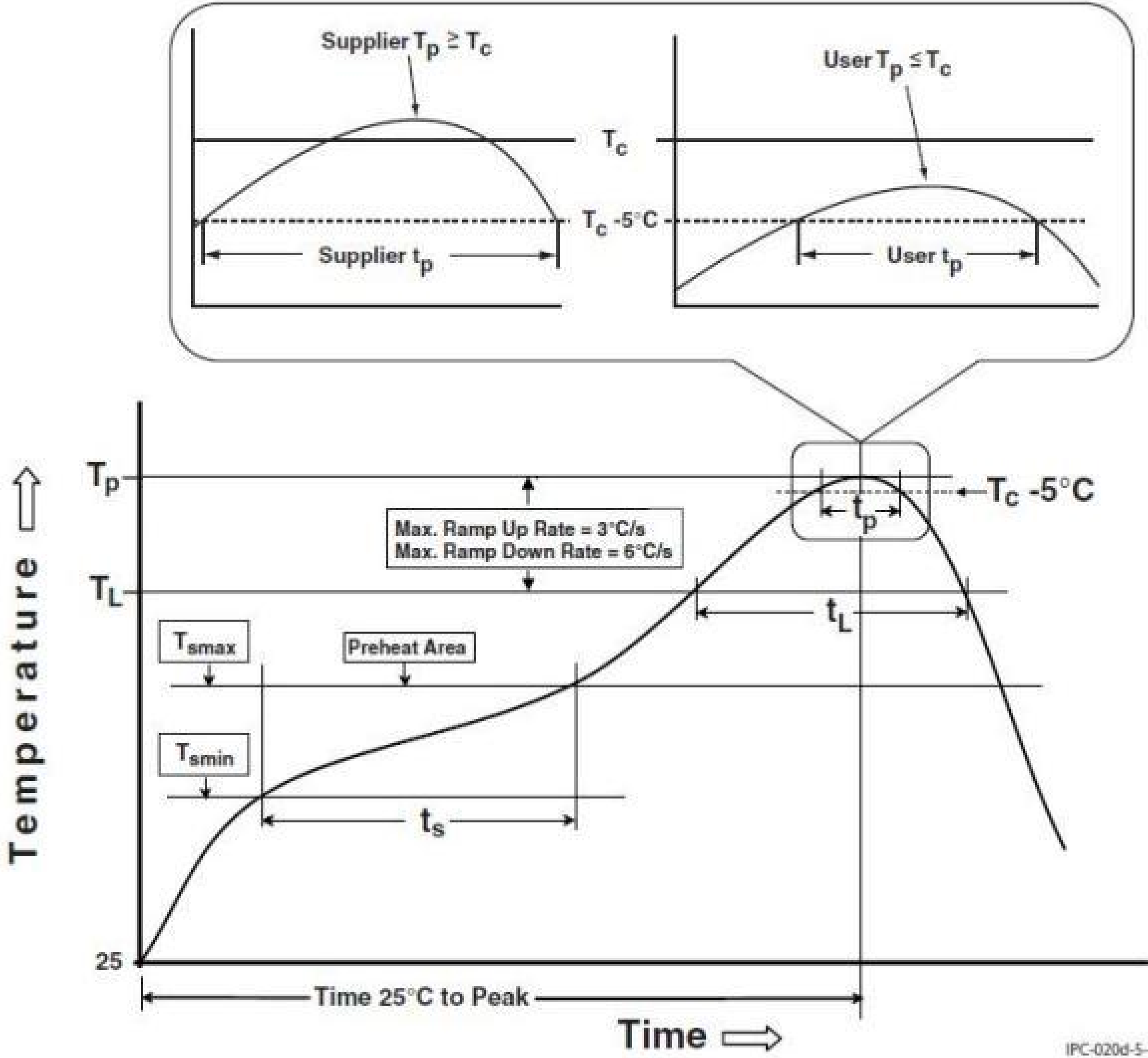
Ref.	Dimensions(in mm)			Ref.	Dimensions(in mm)		
	Min.	Typ.	Max.		Min.	Typ.	Max.
A	0.8	0.9	1	e	2BSC		
A1	0	-	0.2	E	7.9	8	8.1
b	0.9	1	0.85	E1	2	2.1	2.2
D	7.9	8	8.1	E2	2.8	2.9	3
D1	6.9	7	7.1	E3	1.7	1.8	1.9
D2	7.2	7.3	7.4	L1	0.38	0.48	0.58
D3	0.9	1	1.1	L2	0.38	0.48	0.58
D4	0.4	0.5	0.6				

YHJ DFN-8X8 YHJ-65P150AMC Recommended PCB Soldering Footprint



3- Reflow Soldering Profile

Recommended Reflow Soldering Condition (IPC/JEDEC J-STD-020D.1)



➢ Table 6 Recommended Reflow Soldering Condition

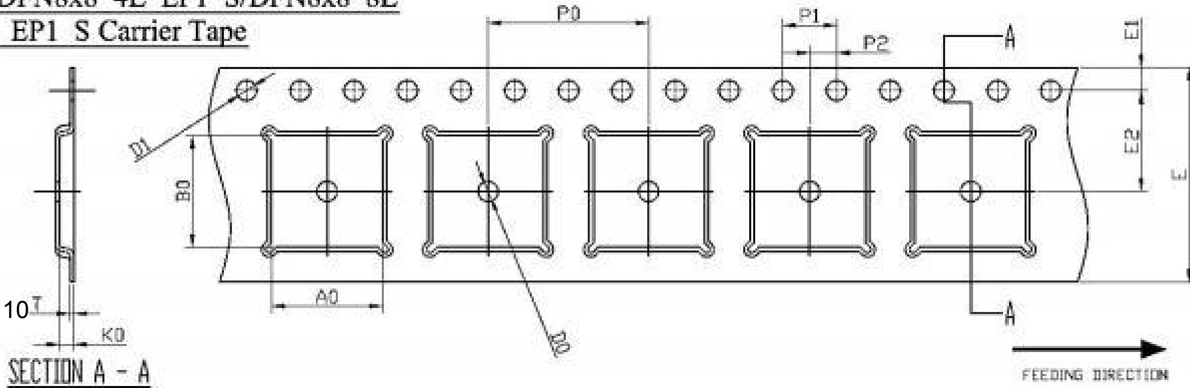
Profile Feature	Pb-Free Assembly
Preheat/Soak Temperature Min (T_{smin}) Temperature Max (T_{smax}) Time (t_s) from (T_{smin} to T_{smax})	 150°C 200°C 60-120 seconds
Ramp-up rate (T_L to T_P)	3°C/second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	217°C 60-150 seconds
Time (t_p)* within 5°C of the specified classification temperature (T_c)**, see Reflow Soldering Profile above.	30* seconds
Ramp-down rate (T_p to T_L)	6°C/second max.
Time 25°C to peak temperature	8 minutes max.

(t_P)* The highest temperature that an individual package body reaches during MSL classification.

(T_C)** The maximum body temperature at which the component manufacturer guarantees the component MSL as noted on the caution and/or bar code label (per J-STD-033).

30* seconds Reflow profiles in this document are for classification/preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in **Table 5**.
For example, if **Tc** is 260 °C and time tp is 30 seconds, this means the following for the supplier and the user.
For a supplier: The peak temperature must be at least 260 °C. The time above 255 °C must be at least 30 seconds.
For a user: The peak temperature must not exceed 260 °C. The time above 255 °C must not exceed 30 seconds

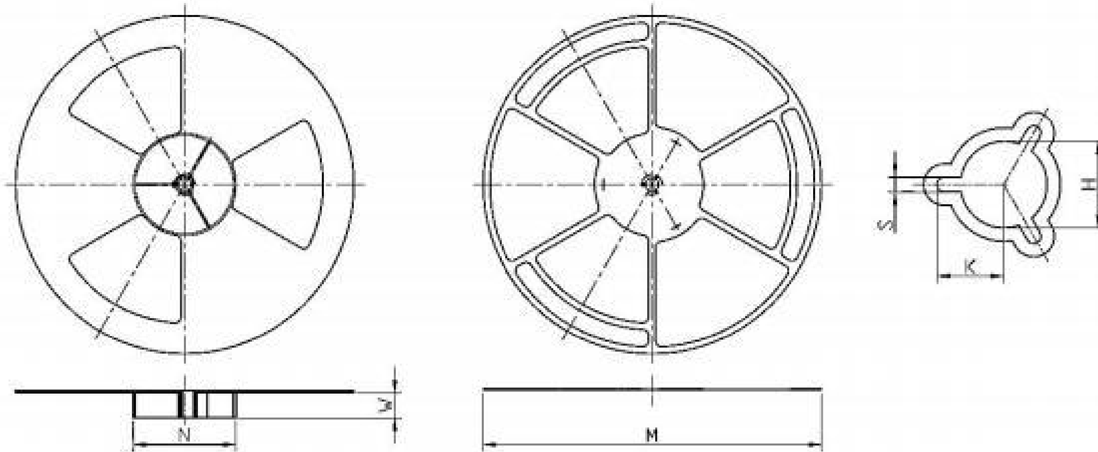
4- Tape and Reel Information



UNIT: MM

PACKAGE	A0	B0	K0	D0	D1	E	E1	E2	P0	P1	P2	T	Q' TY
DFN8×8 (16 mm)	8.30 ±0.10	8.30 ±0.10	1.10 ±0.10	1.50 MIN	$1.5^{+0.10}_{0.00}$	16.00 ±0.30	1.75 ±0.10	7.50 ±0.10	12.00 ±0.10	4.00 ±0.10	2.00 ±0.10	0.30 ±0.10	2500

DFN8x8 4L EP1 S/DFN8x8 8L EP1 S Reel



UNIT: MM

TAPE SIZE	REEL SIZE	PACKAGE Q' TY	M	N	W	H	K	S
16 mm	Φ330	2500/REEL	Φ330.00 MAX.	Φ100.00 MIN.	$16.4^{+2.0}_{-0.0}$	$Φ13.0^{+0.5}_{-0.2}$	10.1 MIN.	1.5 MIN.

5- Change Log

Version	Date	Description
0.1	April 24, 2023	Initial version
0.2		

- ***Note:*** YHJ semiconductor reserves the right to revise products and/or specifications without notice.