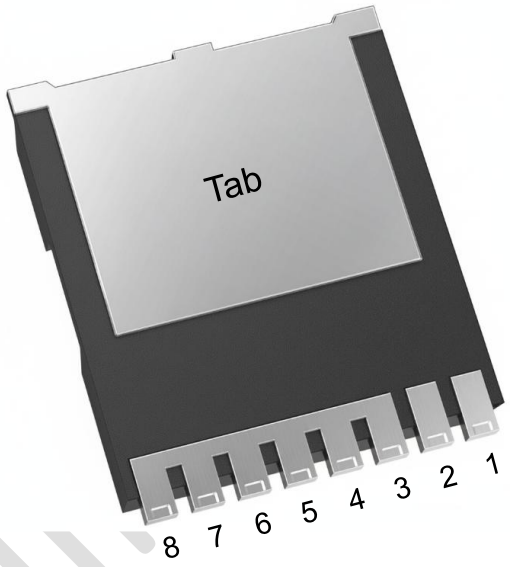
GR-65J035MS: TOLL Cascode GaN HEMT (Preliminary)

Description

GR-65J035MS 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.

GR-65J035MS (TOLL-MOS)



Drain: Tab
Gate : Pin 1
Kelvin Source: Pin 2
Source: Pin 3 ~ Pin 8

Key Specifications

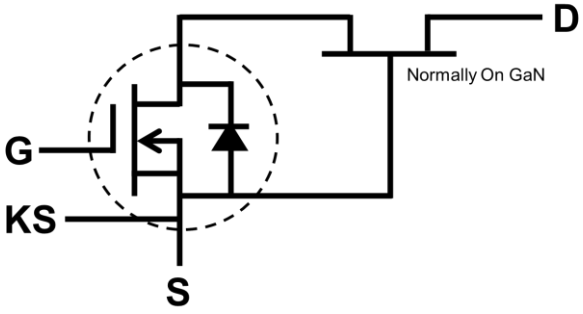
Part Number	GR-65J035MS
V_{DSS}	650V
$V_{(TR)DSS}$	800V
$R_{DS(ON)}$, typ.	34mΩ
Q_G, typ.	23.5nC
Package	TOLL-MOS

Features

- Gate drive voltage compatibility (-20V to +20V)
- High operating frequency
- Pin to Pin with CoolMOS/SJ and SiC MOSFET
- Low Qrr

Applications

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



Cascode Device Structure

1- Electrical Characteristics

➢ Table 1 Absolute maximum ratings

Symbol	Parameter		Value	Unit
V_{DSS}	Drain-source voltage		650	V
V_{GSS}	Gate- source voltage		-20V ~ +20V	V
I_D	Drain current (continuous) at T_C = 25°C operation		52.1	A
	Drain current (continuous) at T_C = 100°C operation		33	A
$I_{D,\ pulse}$	Pulsed drain current (pulse width: 10µs)		195	A
P_D	Maximum power dissipation at T_C = 25°C		192	W
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
MSL	Moisture sensitivity level		MSL3	-

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	50	°C/W
$R_{\Theta JC}$	Thermal resistance junction-case	0.65	°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_{GS}=V_{DS} , I_D=1mA	2.0	3.0	4.0	V
$R_{DS(on)}$	Static drain-source on-resistance	V_{GS}=10V, I_D=20A, T_J=25 °C	-	34	42	mΩ
		V_{GS}=10V, I_D=20A, T_J=150 °C	-	64	-	
I_{DSS}	Drain-source leakage current	V_{GS} =0V, V_{DS} =650V, T_J=25°C	-	3.5	70	μA
		V_{GS} =0V, V_{DS} =650V, T_J=150°C	-	17.5	-	
I_{GSS}	Gate-to-source forward leakage current	V_{GS}= 20V	-	-	400	nA
	Gate-to-source reverse leakage current	V_{GS}=-20V	-	-	-400	
C_{ISS}	Input capacitance	V_{GS}=0V, V_{DS}=400V, f= 1MHz	-	1490	-	pF
C_{OSS}	Output capacitance		-	96	-	
C_{RSS}	Reverse transfer capacitance		-	4.7	-	
Q_G	Gate charge	V_{GS}=0~10V, V_{DS}=400V, I_{DS} =20A	-	23.5	-	nC
Q_{GS}	Gate-source charge		-	5.8	-	
Q_{GD}	Gate-drain charge		-	5.3	-	
Q_{OSS}	Output charge	V_{GS}=0V, V_{DS}=0~400V	-	147	-	
$t_{D(on)}$	Turn-on delay time	V_{DS}=400V, V_{GS}=0 to 10V, I_{DS}=20A ,R_G=25Ω	-	24.5	-	ns
$t_{D(off)}$	Turn-off delay time		-	53	-	
Q_{RR}	Reverse recovery charge	Is=20A, V_{DS} =400V	-	18	-	nC

2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

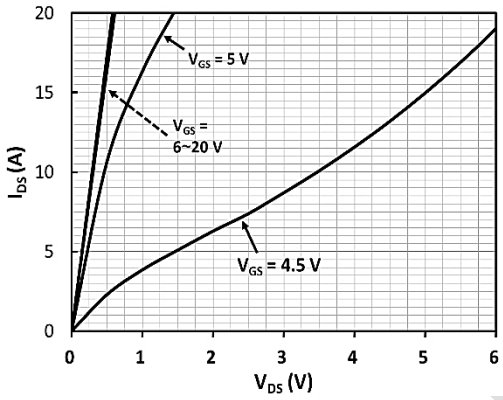


Fig 2. On-Resistance vs Drain Current and Temperature

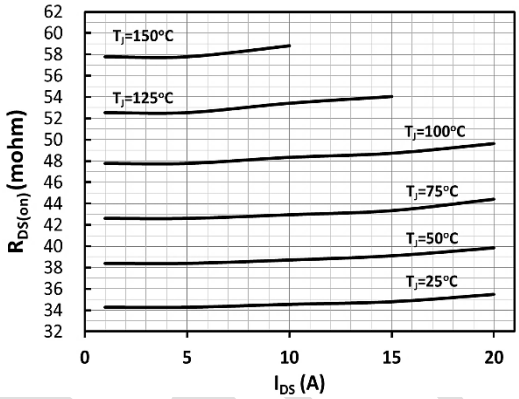


Fig 3. On-Resistance with Drain Current

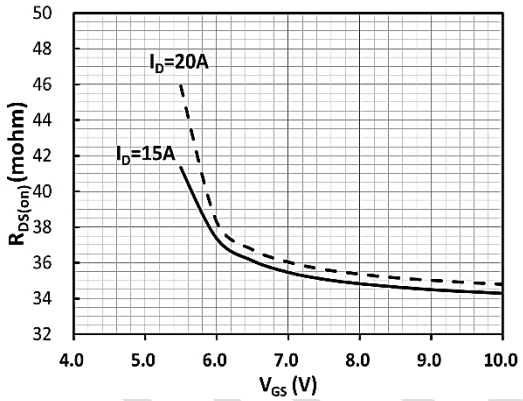


Fig 4. On-Resistance Variation with Temperature

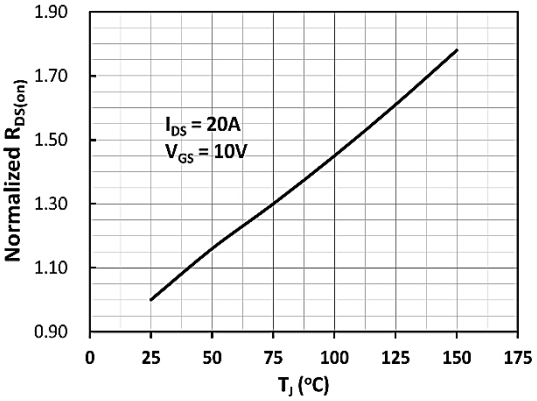


Fig 5. Threshold Voltage with Temperature

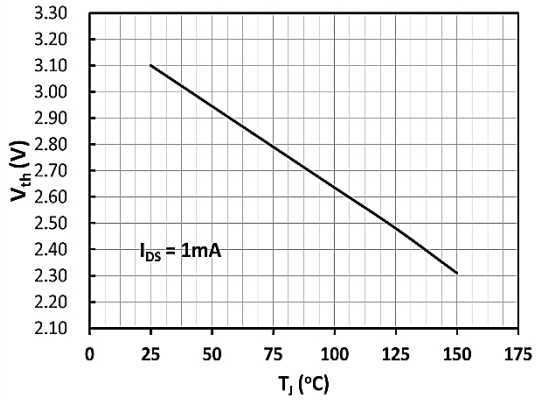


Fig 6. Capacitance Characteristics

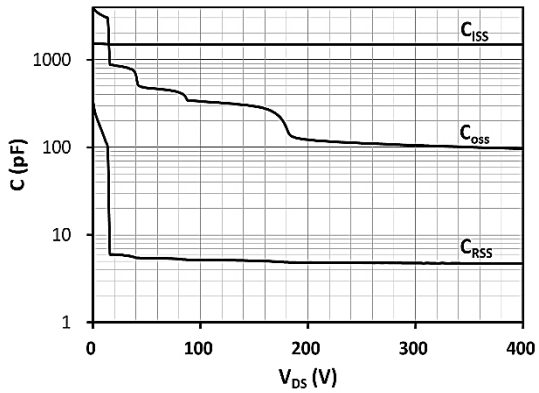


Fig 7. Gate Charge Characteristics, Qg

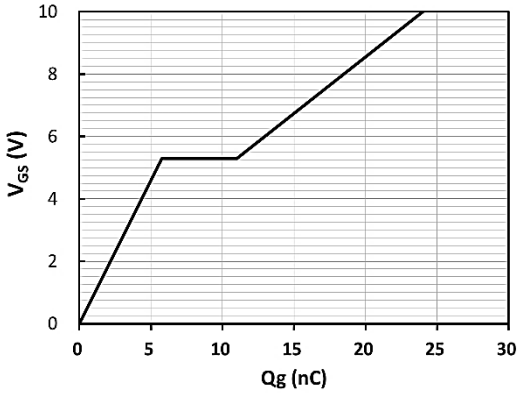


Fig 8. Capacitance Characteristics, Qoss

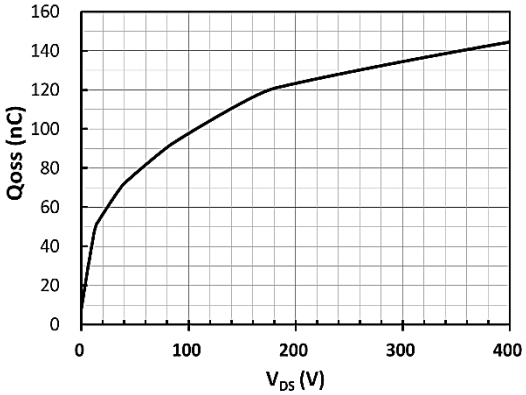
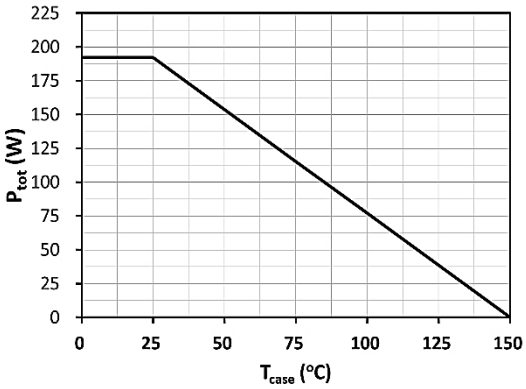
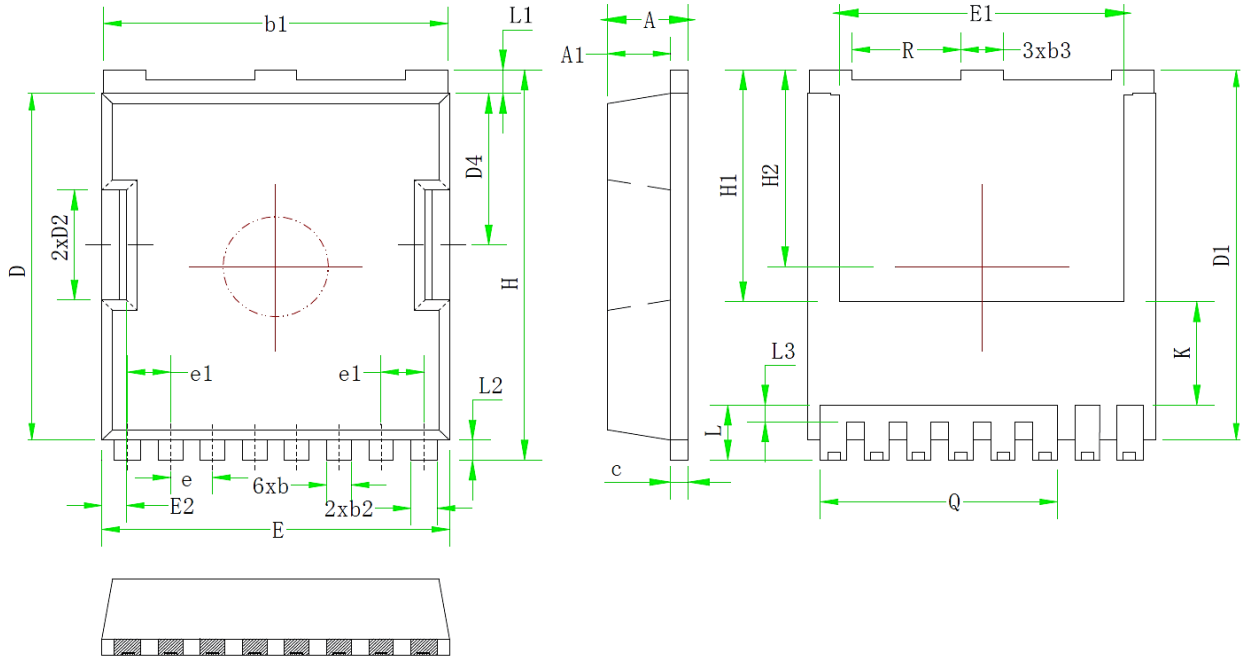


Fig 9. Power Dissipation Derating, Ptot



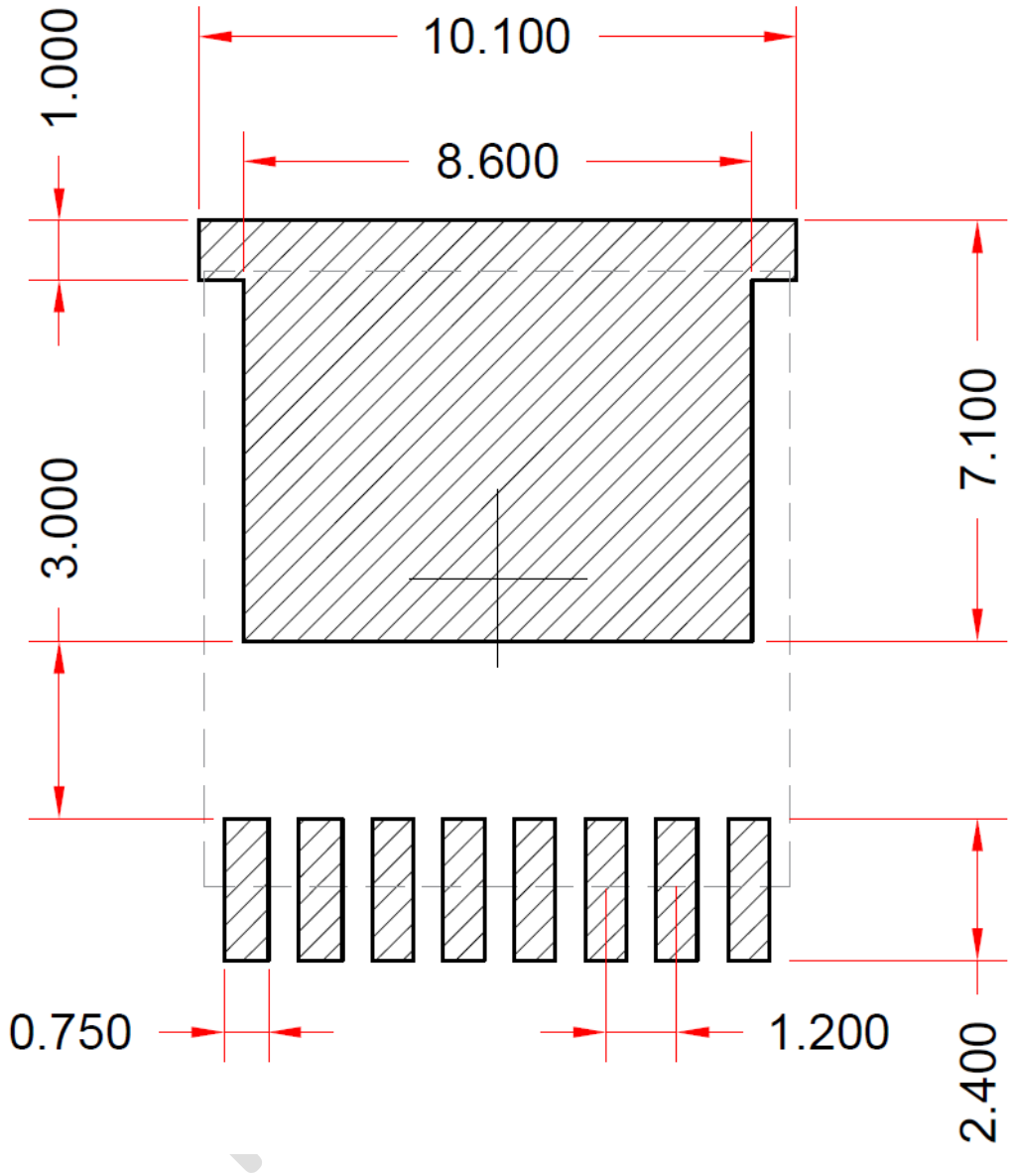
3- Package Outline Dimensions, GR-TOLL-MOS



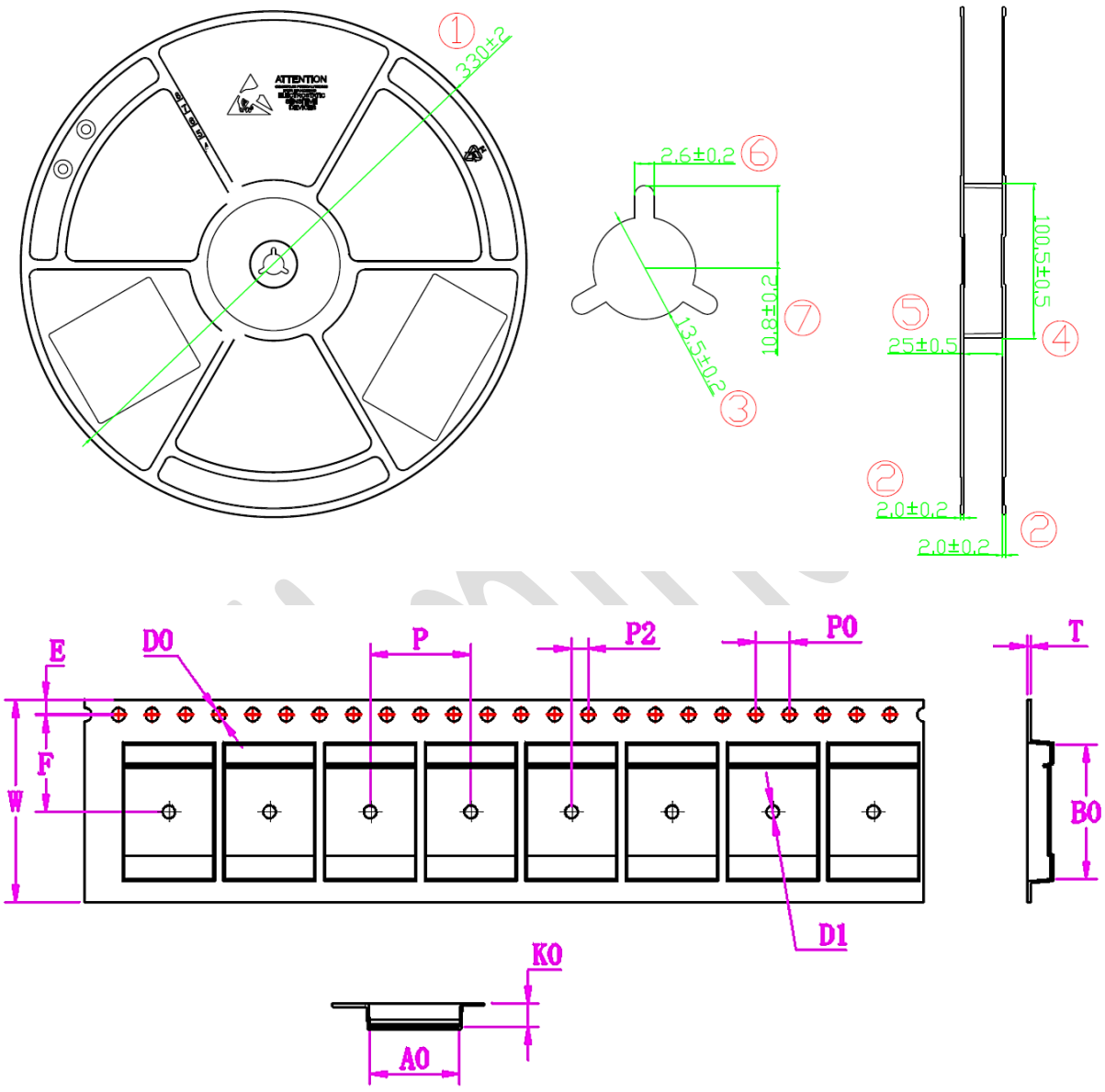
➢ **Table 4 Dimension of GR-TOLL-MOS**

SYMBOL	DIMENSION (IN MM)			SYMBOL	DIMENSION (IN MM)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	2.25	2.30	2.35	E	9.85	9.90	9.95
A1	1.75	1.80	1.85	E1	8.00	8.10	8.20
b	0.65	0.70	0.75	E2	0.65	0.70	0.75
b1	9.75	9.80	9.90	H	11.60	11.70	11.80
b3	0.70	0.75	0.80	H1	6.95 BSC		
c	1.15	1.20	1.25	H2	5.90 BSC		
D	0.45	0.50	0.55	K	3.10 REF		
D1	10.35	10.40	10.45	L	1.55	1.65	1.75
D2	11.00	11.10	11.20	L1	0.65	0.70	0.75
D3	3.25	3.30	3.35	L2	0.50	0.60	0.70
D4	4.50	4.55	4.60	L3	0.40	0.50	0.60
e	1.20 BSC			Q	6.75 REF		
e1	1.225 BSC			R	3.00	3.10	3.20

4- Recommended PCB Footprint, GR-TOLL-MOS

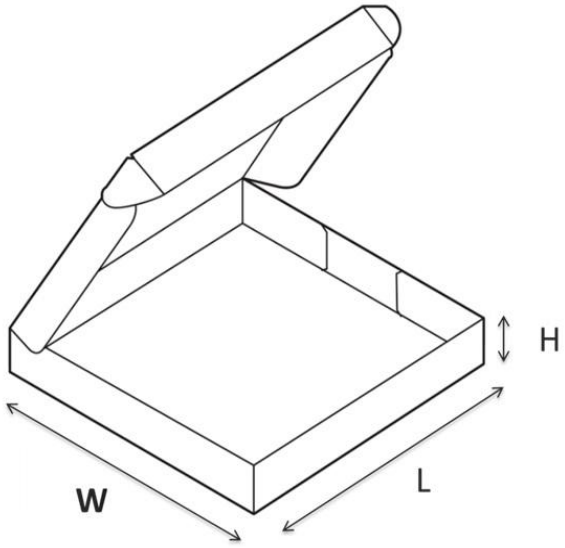


5- Tape Reel & Package Information



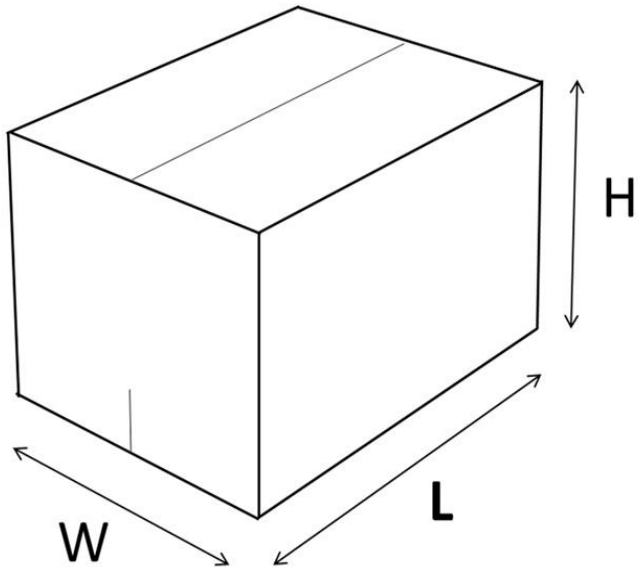
Symbol	A0	B0	K0	D0	D1	P	P0
Spec.	10.3±0.1	12.1±0.1	2.65±0.1	1.5±0.1	1.6±0.1	12.0±0.1	4.0±0.1
Symbol	W	E	F	P2	T	-	10*P0
Spec.	24.0±0.3	1.75±0.1	11.5±0.1	2.0±0.1	0.35±0.05	-	40±0.2

Package Information



	Inner BOX, mm
L	360
W	340
H	50
Weight	2.0 KG

Each box contains one Reel, and
each Reel contains 2000 components



	Outer Catron (mm)
L	380
W	360
H	340
Weight	14.5 KG

Each Carton contains 6 boxes,
Total of 12500 components

6- Change Log

Version	Date	Description
01	Nov 28, 2023	Initial version
02	August 22, 2025	Electrical characteristics, Curve and Package information revised
03	April 16, 2026	Electrical characteristics revised

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