

GR-65J016MS: TOLL Cascode GaN HEMT (Preliminary)

Description

GR-65J016MS 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

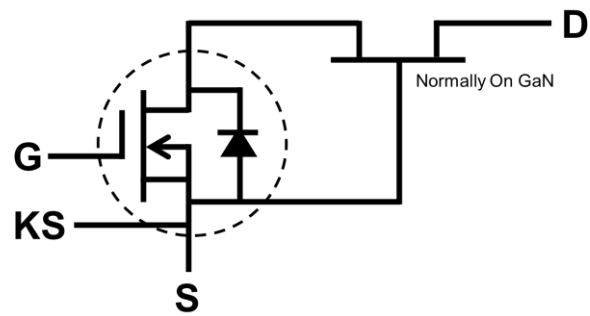
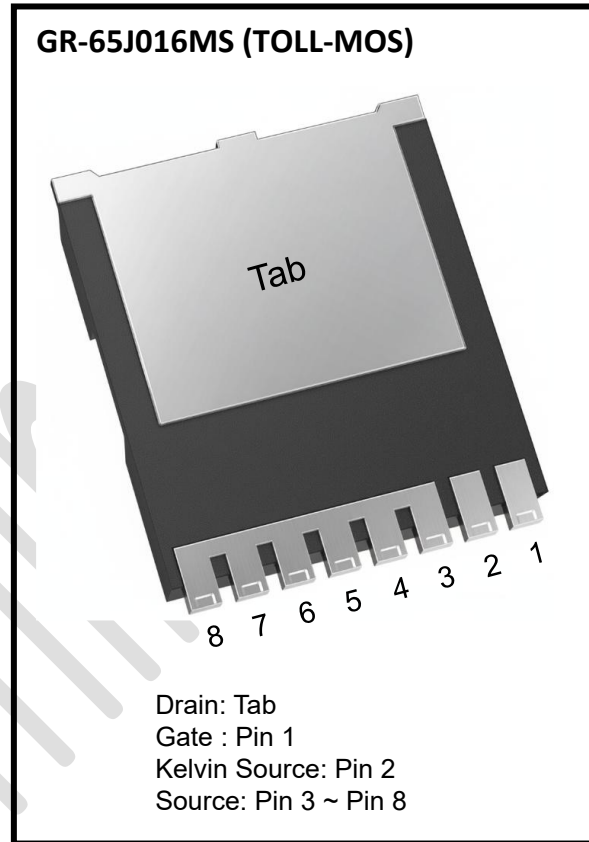
Part Number	GR-65J016MS
V _{DSS}	650V
V _{(TR)DSS}	800V
R _{DS(ON)} , typ.	15mΩ
Q _G , typ.	78nC
Package	TOLL-MOS

Features

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

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	92.5	A
	Drain current (continuous) at T _C = 100°C operation	58.5	A
I _{D, pulse}	Pulsed drain current (pulse width: 10μs)	347	A
P _D	Maximum power dissipation at T _C = 25°C	260	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 _{θJA}	Thermal resistance junction-ambient	45	°C/W
R _{θJC}	Thermal resistance junction-case	0.48	°C/W

Table 3 Electrical Characteristics ($T_{CASE} = 25\text{ }^{\circ}\text{C}$ 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	$V_{GS}=10V$, $I_D=20A$, $T_J=25\text{ }^{\circ}\text{C}$	-	15	18	mΩ
		$V_{GS}=10V$, $I_D=20A$, $T_J=150\text{ }^{\circ}\text{C}$	-	28	-	
I_{DSS}	Drain-source leakage current	$V_{GS}=0V$, $V_{DS}=650V$, $T_J=25\text{ }^{\circ}\text{C}$	-	3.5	70	μA
		$V_{GS}=0V$, $V_{DS}=650V$, $T_J=150\text{ }^{\circ}\text{C}$	-	17.5	-	
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	$V_{GS}=0V$, $V_{DS}=400V$, $f=1MHz$	-	4900	-	pF
C_{OSS}	Output capacitance		-	285	-	
C_{RSS}	Reverse transfer capacitance		-	5.5	-	
Q_G	Gate charge	$V_{GS}=0\sim 10V$, $V_{DS}=400V$, $I_{DS}=20A$	-	78	-	nC
Q_{GS}	Gate-source charge		-	32	-	
Q_{GD}	Gate-drain charge		-	20	-	
Q_{OSS}	Output charge	$V_{GS}=0V$, $V_{DS}=0\sim 400V$	-	428	-	
$t_{D(on)}$	Turn-on delay time	$V_{DS}=400V$, $V_{GS}=0$ to $10V$, $I_{DS}=20A$, $R_G=25\Omega$	-	78	-	ns
$t_{D(off)}$	Turn-off delay time		-	110	-	
Q_{RR}	Reverse recovery charge	$I_S=20A$, $V_{DS}=400V$	-	450	-	nC

2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

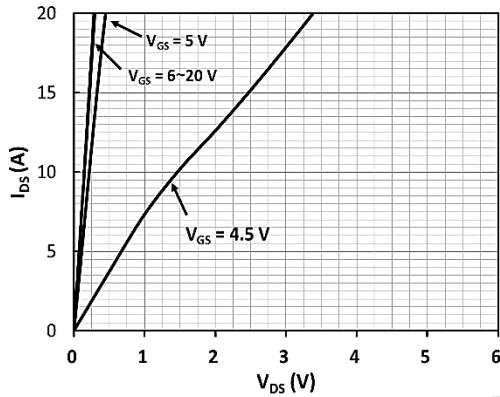


Fig 2. On-Resistance vs Drain Current and Temperature

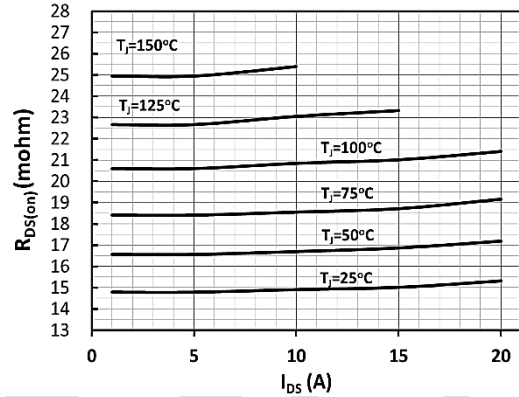


Fig 3. On-Resistance with Drain Current

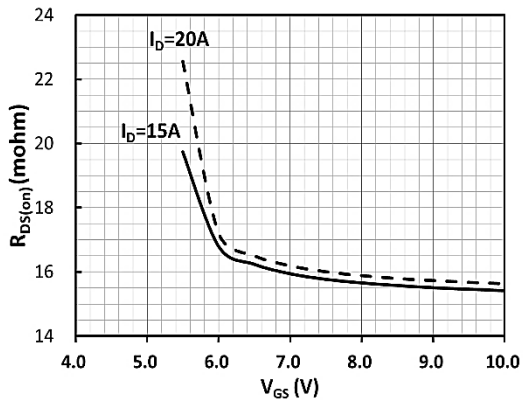


Fig 4. On-Resistance Variation with Temperature

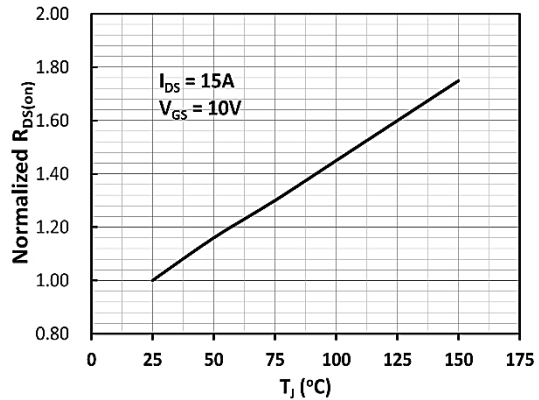


Fig 5. Threshold Voltage with Temperature

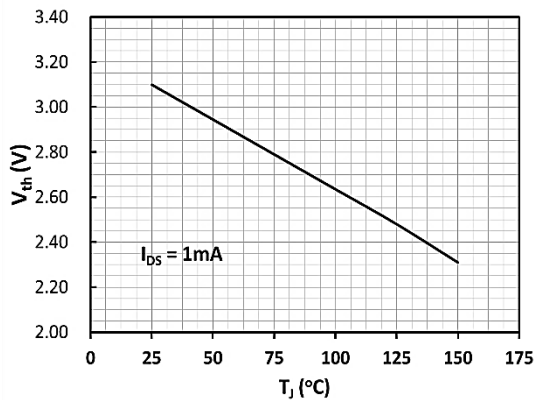


Fig 6. Capacitance Characteristics

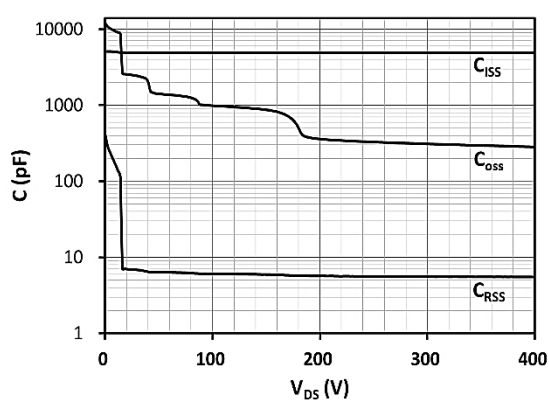


Fig 7. Gate Charge Characteristics, Qg

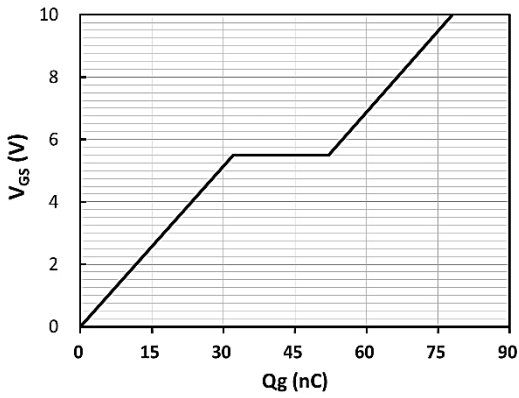


Fig 8. Capacitance Characteristics, Qoss

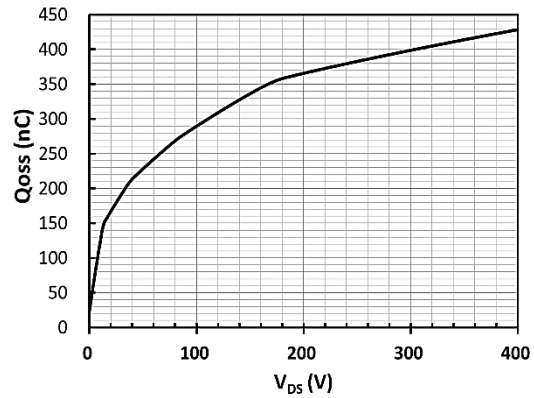
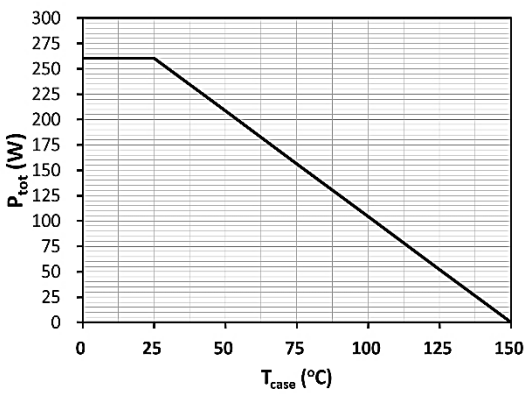
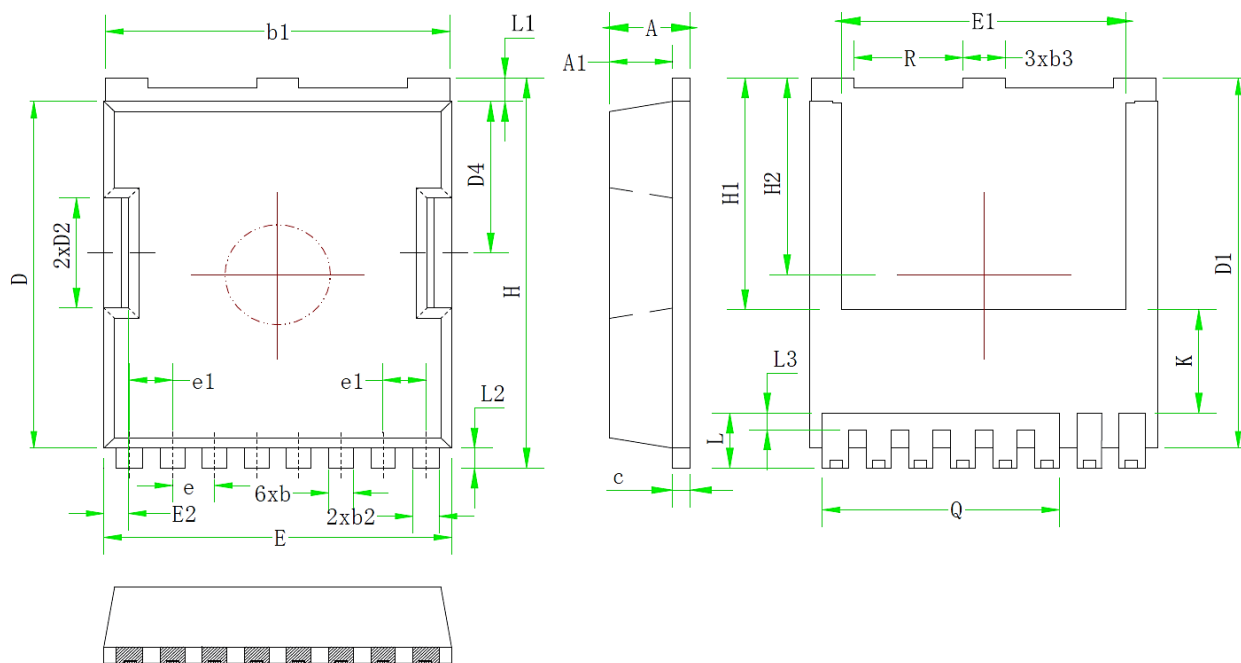


Fig 9. Power Dissipation Derating, Ptot



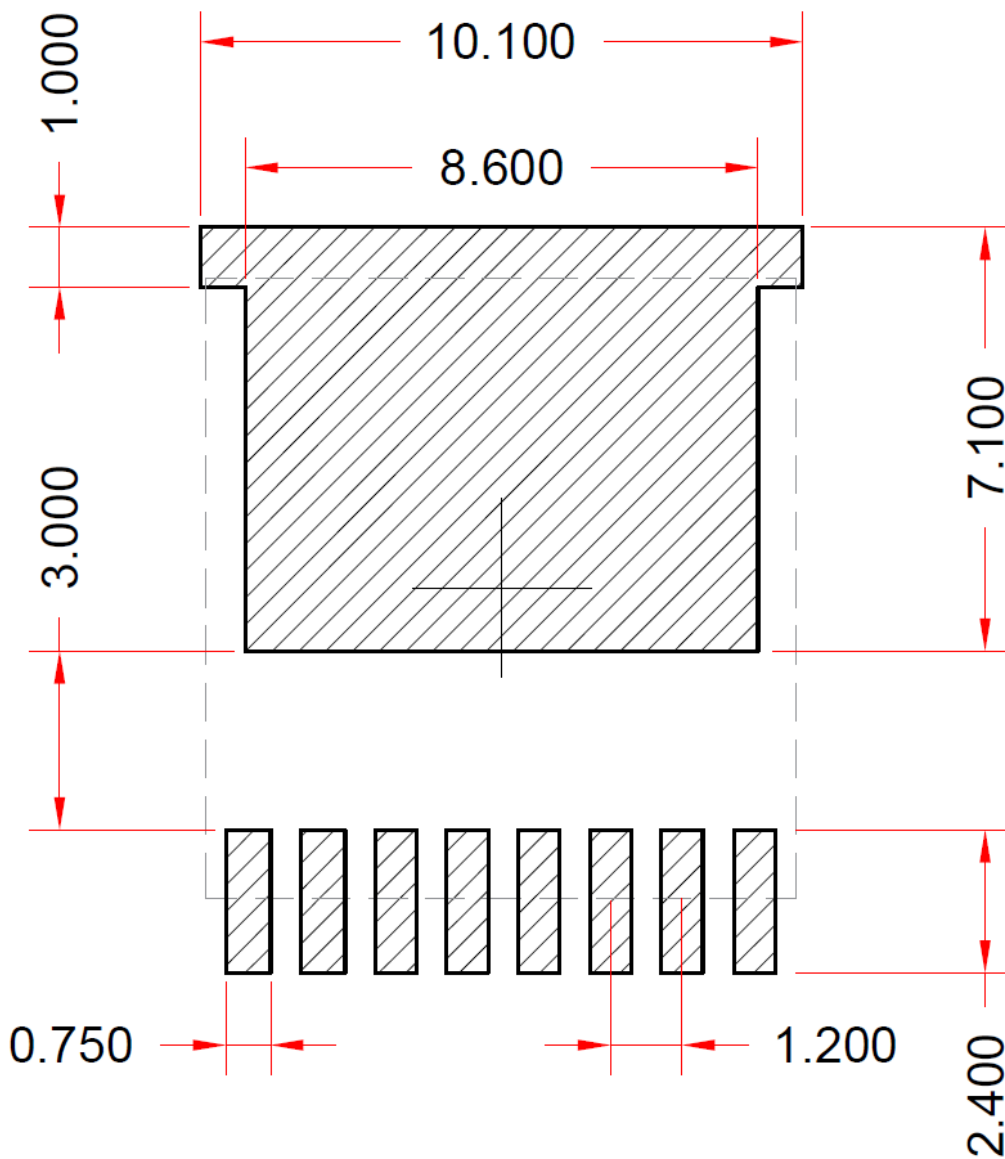
3- Package Outline Dimensions, GR-TOLL-MOS



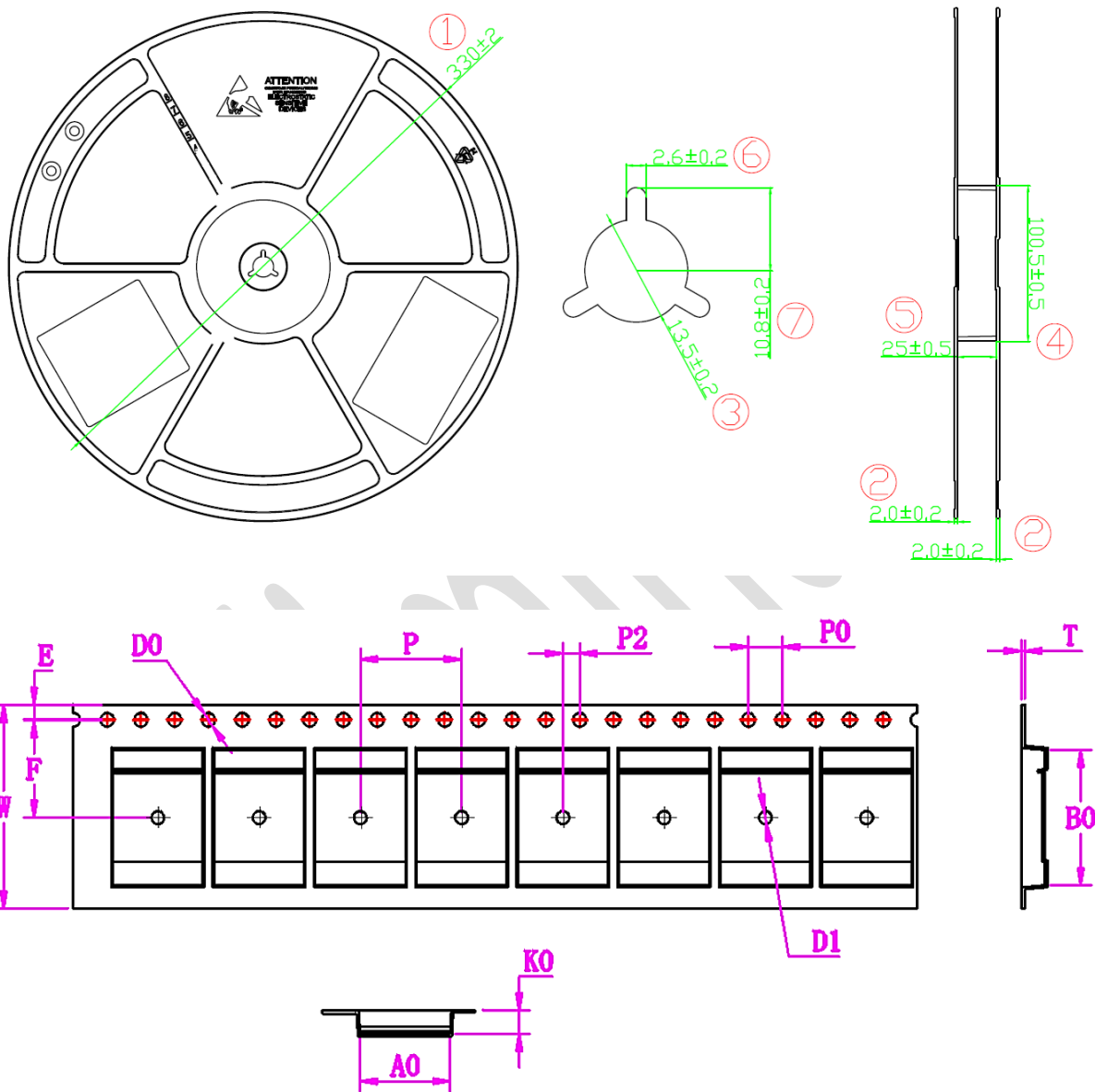
➤ Table 4 Dimension of GR-TOLL-MOS

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

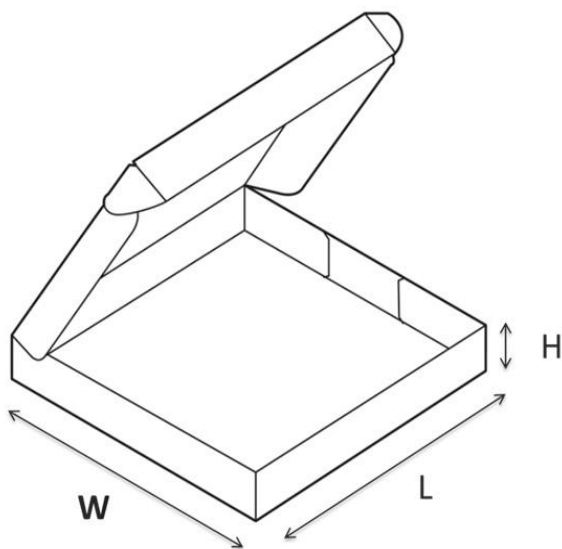


5- Tape Reel & Package Information



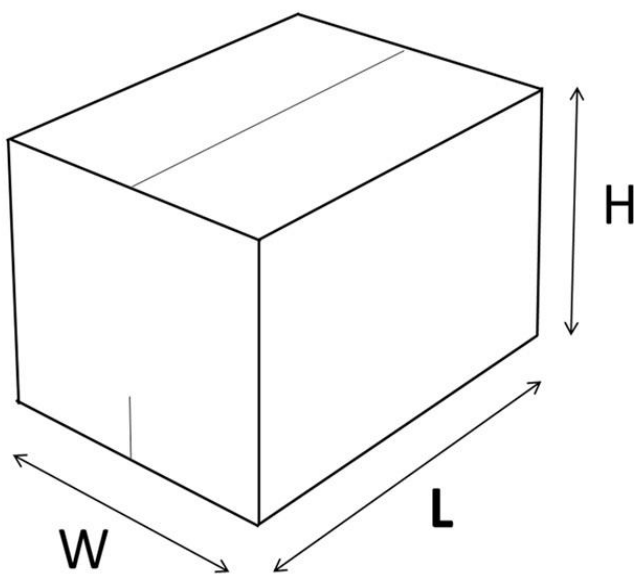
Symbol	A0	B0	K0	D0	D1	P	P0
Spec.	10.3±0.1	12.1±0.1	2.65±0.1	1.5±0.1	1.6±0.1	12.0±0.1	4.0±0.1
Symbol	W	E	F	P2	T	-	10*P0
Spec.	24.0±0.3	1.75±0.1	11.5±0.1	2.0±0.1	0.35±0.05	-	40±0.2

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 Carton (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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