

# GR-65J075ED: TOLL-9 Cascode GaN HEMT

## Description

GR-65J075ED 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

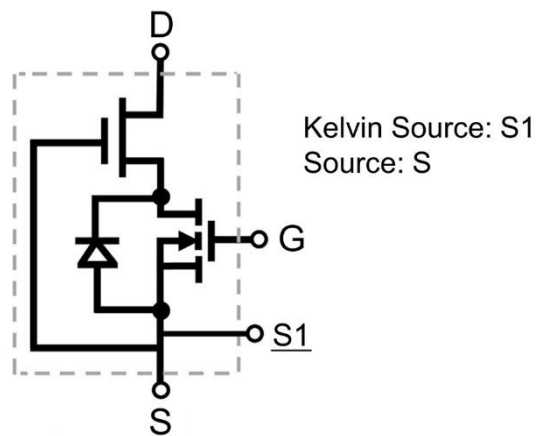
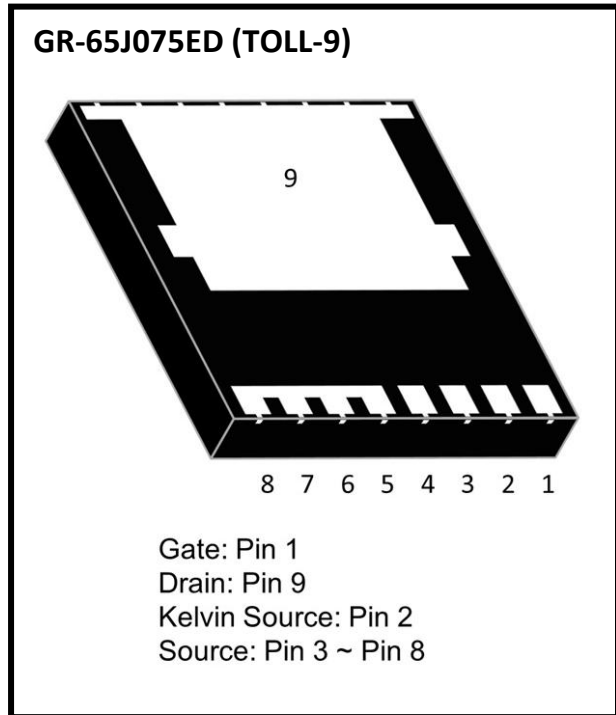
Part Number	GR-65J075ED
V <sub>DSS</sub>	650V
V <sub>(TR)DSS</sub>	800V
R <sub>DS(ON)</sub> , typ.	74mΩ
Q <sub>G</sub> , typ.	12.4nC
Package	DFN 9.9 x 10.5 mm

## Features

- Gate drive voltage compatibility (-20V to +20V)
- High operating frequency
- Low Q<sub>rr</sub>
- 1.5kV HBM ESD

## 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 <sub>DSS</sub>	Drain-source voltage	650	V
V <sub>GSS</sub>	Gate- source voltage	-20V ~ +20V	V
I <sub>D</sub>	Drain current (continuous) at T <sub>C</sub> = 25°C operation	22.5	A
	Drain current (continuous) at T <sub>C</sub> = 100°C operation	14.3	A
I <sub>D,pulse</sub>	Pulsed drain current (pulse width: 10μs)	84.4	A
P <sub>D</sub>	Maximum power dissipation T <sub>C</sub> =25 °C	78	W
T <sub>C</sub>	Operating temperature	Case	-55 to +150 °C
T <sub>J</sub>		Junction	-55 to +150 °C
T <sub>S</sub>	Storage temperature	-55 to +150	°C
T <sub>SOLD</sub>	Soldering peak temperature <sup>b</sup>	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 <sub>θJA</sub>	Thermal resistance junction-ambient	63	°C/W
R <sub>θJC</sub>	Thermal resistance junction-case	1.6	°C/W

➤ **Table 3 Electrical Characteristics** ( $T_{CASE} = 25\text{ °C}$  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	$V_{GS}=10V, I_D=5A, T_J=25\text{ °C}$	-	74	91	mΩ
		$V_{GS}=10V, I_D=5A, T_J=150\text{ °C}$	-	133	-	
$I_{DSS}$	Drain-source leakage current	$V_{GS}=0V, V_{DS}=650V, T_J=25\text{ °C}$	-	3.0	60	μA
		$V_{GS}=0V, V_{DS}=650V, T_J=150\text{ °C}$	-	15	-	
$I_{GSS}$	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	$V_{GS}=0V, V_{DS}=400V, f=1MHz$	-	676	-	pF
$C_{OSS}$	Output capacitance		-	25.2	-	
$C_{RSS}$	Reverse transfer capacitance		-	1.33	-	
$Q_G$	Gate charge	$V_{GS}=0\sim 10V, V_{DS}=400V, I_{DS}=5A$	-	12.4	-	nC
$Q_{GS}$	Gate-source charge		-	3.4	-	
$Q_{GD}$	Gate-drain charge		-	2.2	-	
$Q_{OSS}$	Output charge	$V_{GS}=0V, V_{DS}=0\sim 400V$	-	40.6	-	nC
$t_{D(on)}$	Turn-on delay time	$V_{DS}=400V, V_{GS}=0\text{ to }10V, I_{DS}=2A, R_G=25\Omega$	-	10.4	-	ns
$t_{D(off)}$	Turn-off delay time		-	16.9	-	
$Q_{RR}$	Reverse recovery charge	$I_S=5A, V_{DS}=400V$	-	7.8	-	nC

## 2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

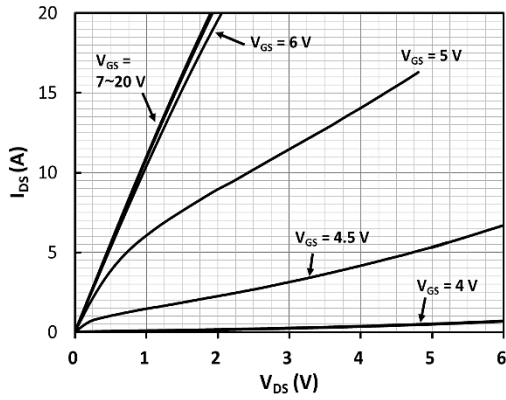


Fig 2. On-Resistance vs Drain Current and Temperature

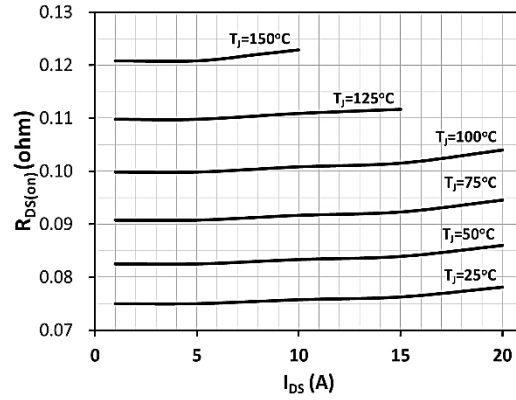


Fig 3. On-Resistance with Drain Current

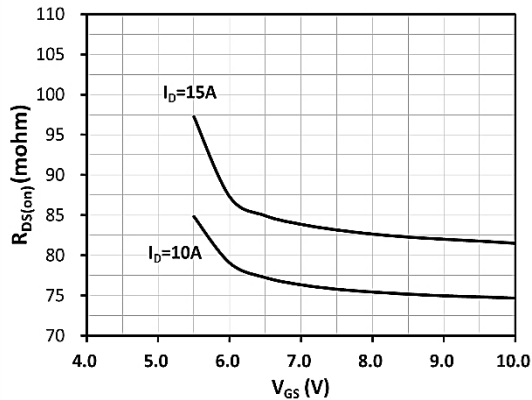


Fig 4. On-Resistance Variation with Temperature

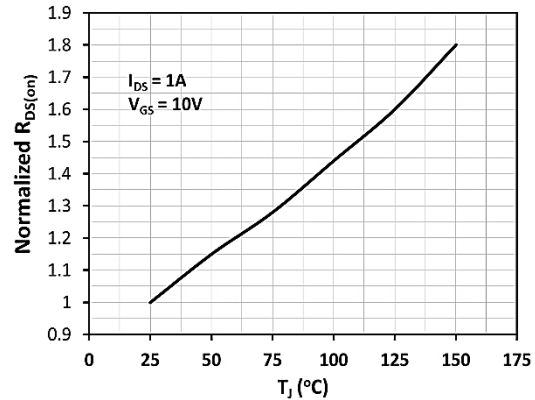


Fig 5. Threshold Voltage with Temperature

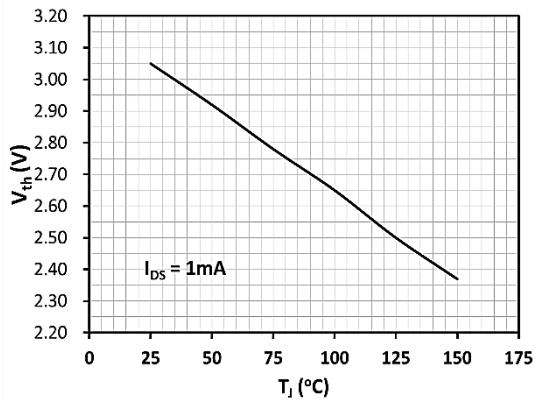


Fig 6. Capacitance Characteristics

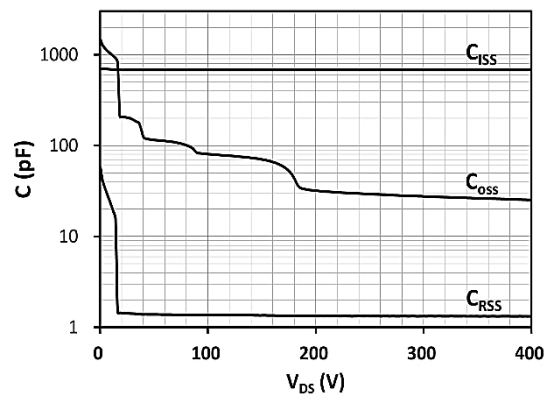


Fig 7. Gate Charge Characteristics, Qg

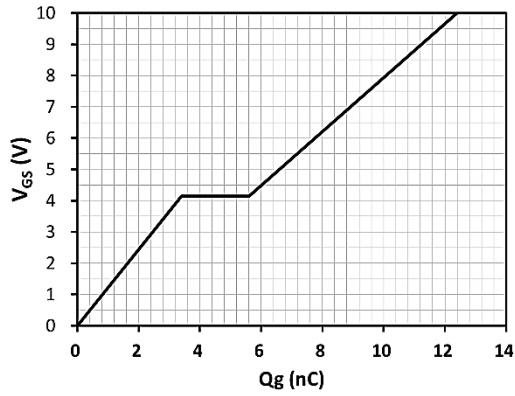


Fig 8. Capacitance Characteristics, Qoss

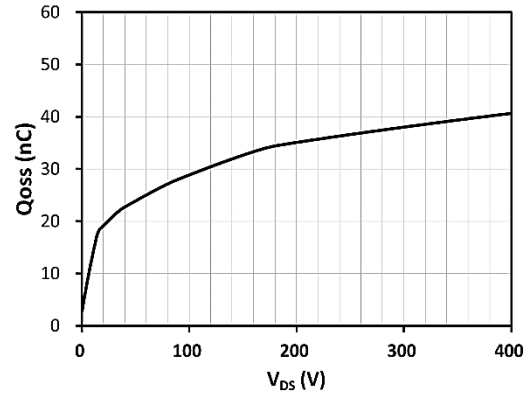
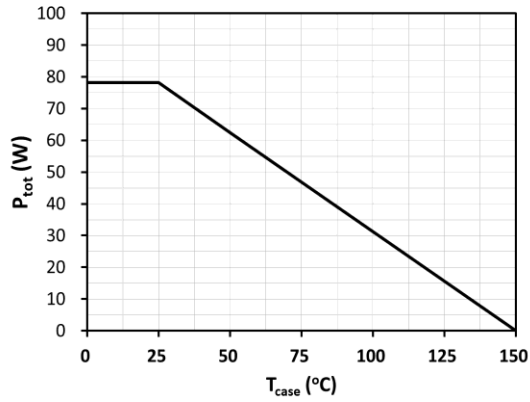
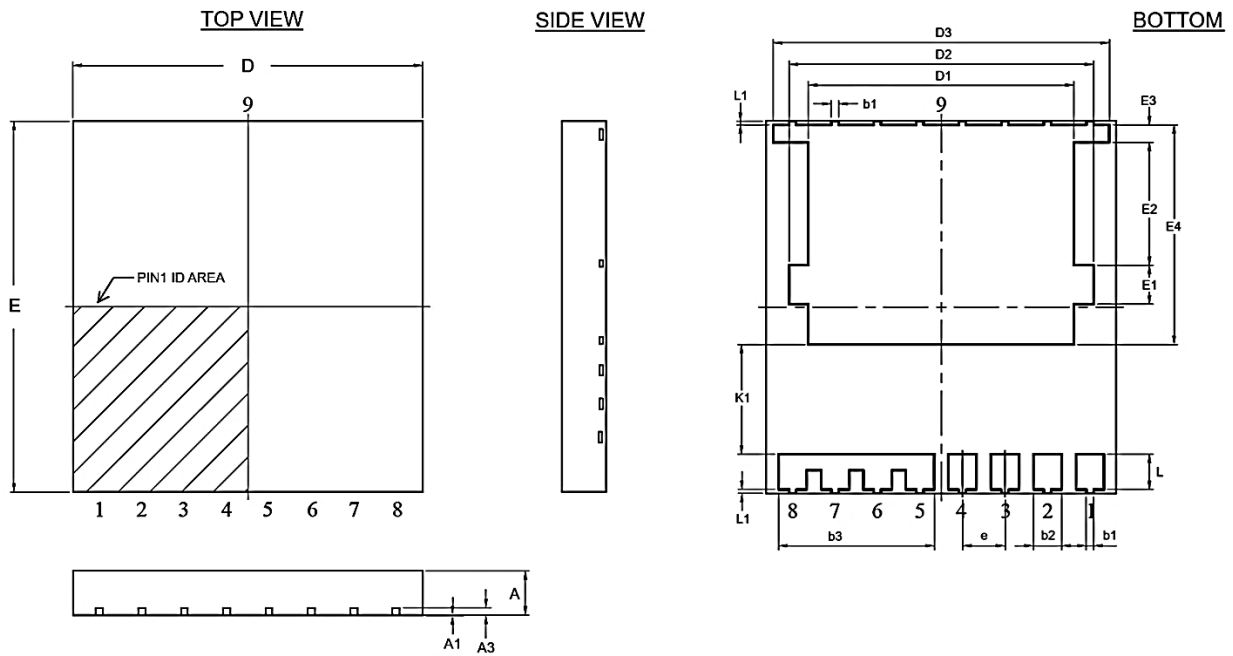


Fig 9. Power Dissipation Derating, Ptot



**3- Package Outline Dimensions, GR- TOLL-9**

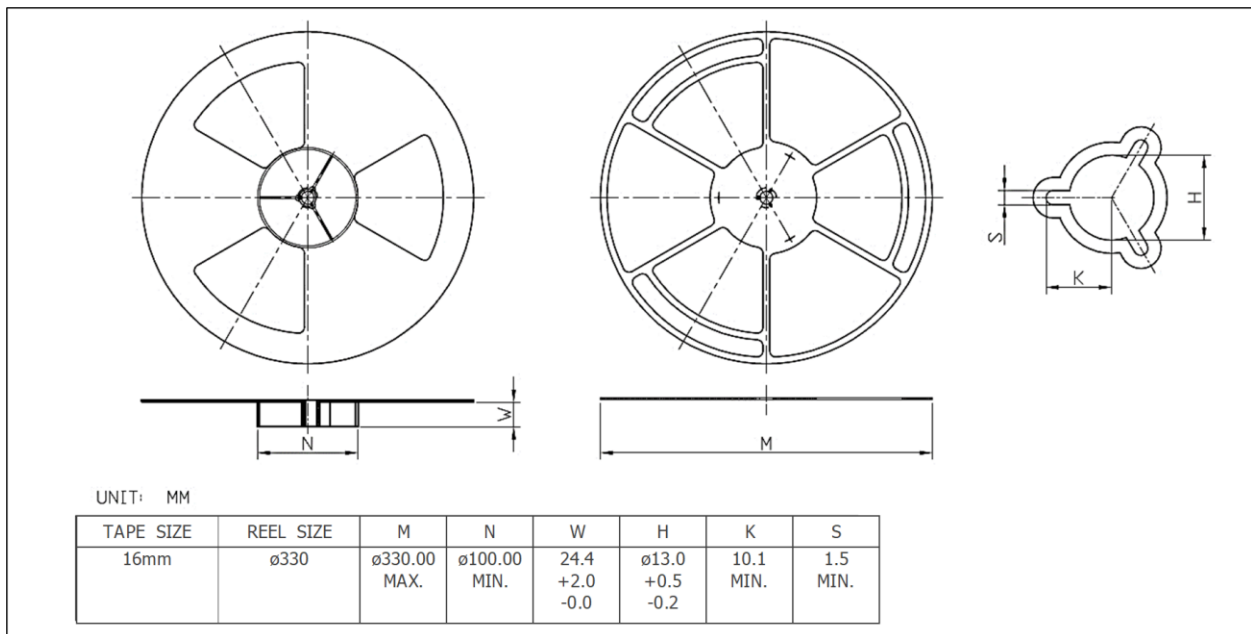
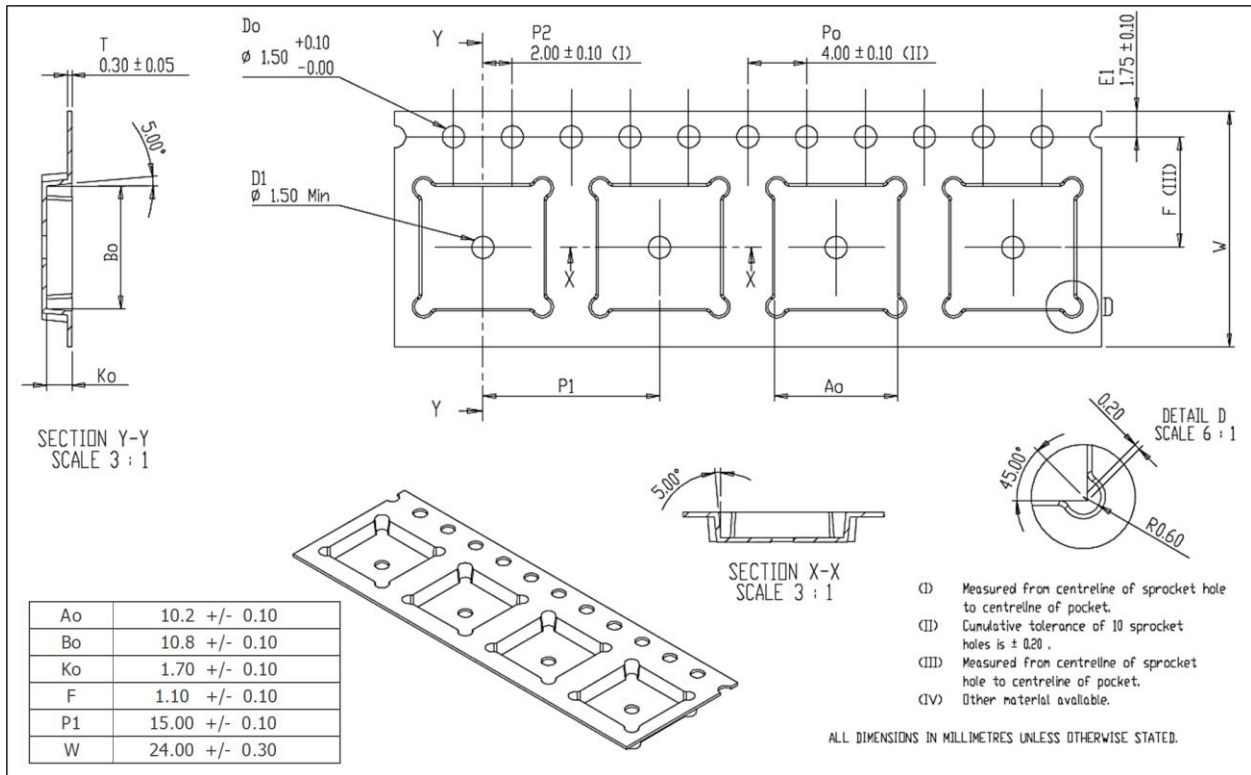


➤ **Table 4 Dimension of GR -TOLL-9**

SYMBOL	DIMENSION (MM)			SYMBOL	DIMENSION (IN MM)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
<b>A</b>	1.20	1.25	1.30	<b>E3</b>	0.40	0.50	0.60
<b>A1</b>	--	0.02	0.05	<b>E4</b>	6.10	6.20	6.30
<b>A3</b>	0.203 REF			<b>L</b>	1.00	1.10	1.20
<b>D</b>	9.80	9.90	10.0	<b>L1</b>	0.10 REF		
<b>D1</b>	7.40	7.50	7.60	<b>K1</b>	3.00	3.10	3.20
<b>D2</b>	8.50	8.60	8.70	<b>b1</b>	0.20 REF		
<b>D3</b>	9.40	9.50	9.60	<b>b2</b>	0.70	0.80	0.90
<b>E</b>	10.4	10.5	10.6	<b>b3</b>	4.30	4.40	4.50
<b>E1</b>	1.00	1.10	1.20	<b>e</b>	2.10 BSC		
<b>E2</b>	3.37	3.47	3.57	--	--	--	--



### 4- Tape and Reel Information



## 5- Change Log

Version	Date	Description
01	September 2, 2024	Initial version
02	February 17, 2025	Add Characteristic Curve
03	April 16, 2026	Electrical characteristics revised

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