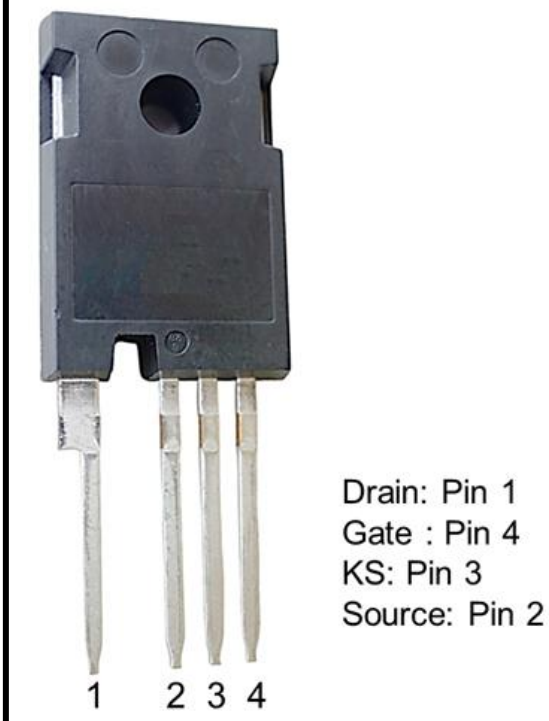
GR-65J050KT: TO-247-4L Cascode GaN HEMT

Description

GR-65J050KT 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-65J050KT (TO-247-4L)



Key Specifications

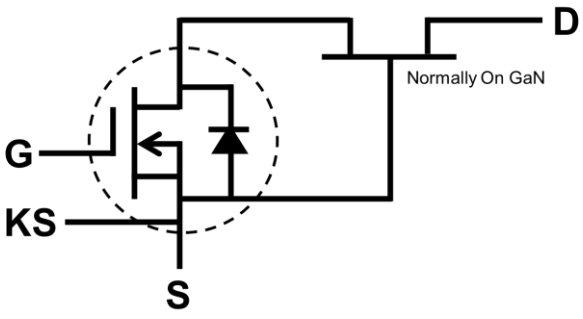
Part Number	GR-65J050KT
V_{DSS}	650V
$V_{(TR)DSS}$	800V
$R_{DS(ON)}$, typ.	51mΩ
Q_G, typ.	12.5nC
Package	TO-247-4L

Features

- Gate drive voltage compatibility (-20V to +20V)
- High operating frequency
- Pin to Pin with CoolMOS/SJ and SiC MOSFET
- Low Qrr
- 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_{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		33.5	A
	Drain current (continuous) at T_C = 100°C operation		21.5	A
$I_{D,pulse}$	Pulsed drain current (pulse width: 10μs)		125	A
P_D	Maximum power dissipation Tc=25 °C		139	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	55	°C/W
$R_{\Theta JC}$	Thermal resistance junction-case	0.9	°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=5A, T_J=25°C	-	51	63	mΩ
		V_{GS}=10V, I_D=5A, T_J=150°C	-	94	-	
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	-	-	100	nA
	Gate-to-source reverse leakage current	V_{GS}=-20V	-	-	-100	
C_{ISS}	Input capacitance	V_{GS}=0V, V_{DS}=400V, f=1MHz	-	741	-	pF
C_{OSS}	Output capacitance		-	47.9	-	
C_{RSS}	Reverse transfer capacitance		-	1.42	-	
Q_G	Gate charge	V_{GS}=0~10V, V_{DS}=400V, I_{DS} = 5A	-	12.5	-	nC
Q_{GS}	Gate-source charge		-	2.43	-	
Q_{GD}	Gate-drain charge		-	4.09	-	
Q_{OSS}	Output charge	V_{GS}=0V, V_{DS}=0~400V	-	72.2	-	
$t_{D(on)}$	Turn-on delay time	V_{DS}=400V, V_{GS}=0 to 10V, I_{DS}=2A, R_G=25Ω	-	11.2	-	ns
$t_{D(off)}$	Turn-off delay time		-	26.0	-	
Q_{RR}	Reverse recovery charge	Is=5A, V_{DS} =400V	-	8.8	-	nC
V_{SD}	Diode forward voltage	V_{GS}= 0V, I_{SD}= 20A, T_J=25°C	-	2.05	-	V

2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

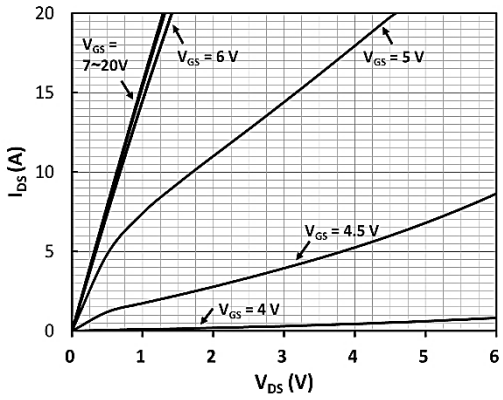


Fig 2. On-Resistance vs Drain Current and Temperature

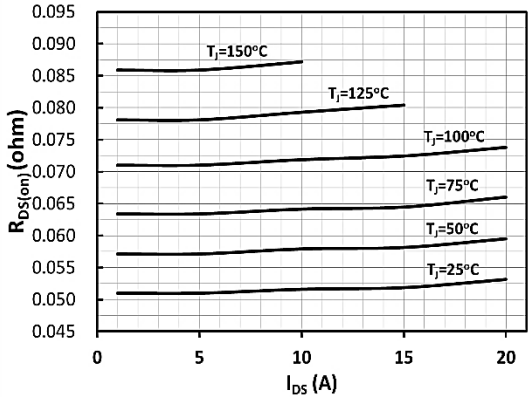


Fig 3. On-Resistance with Drain Current

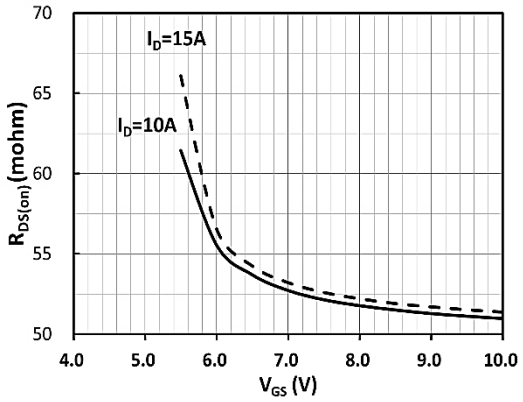


Fig 4. On-Resistance Variation with Temperature

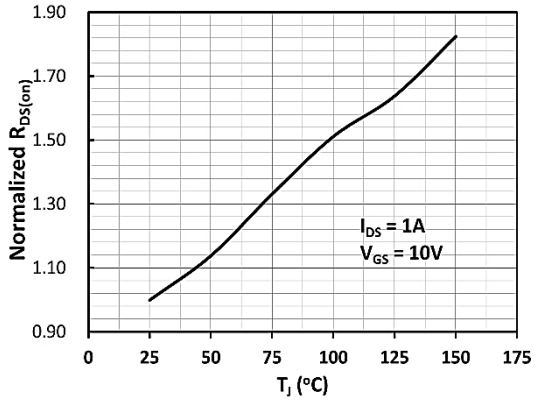


Fig 5. Threshold Voltage with Temperature

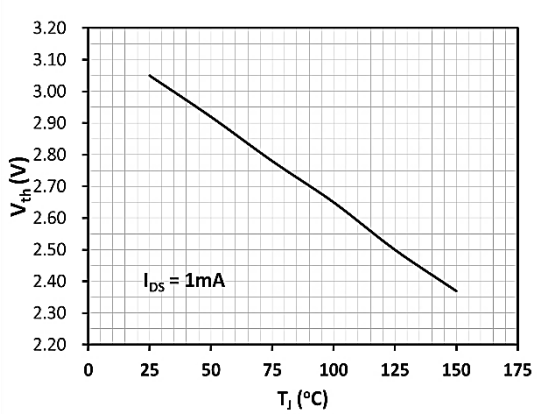


Fig 6. Capacitance Characteristics

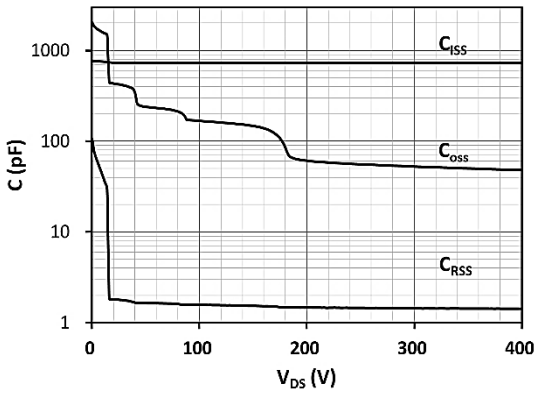


Fig 7. Gate Charge Characteristics, Qg

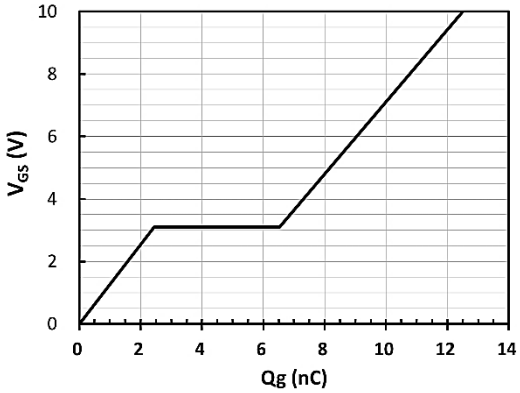


Fig 8. Capacitance Characteristics, Qoss

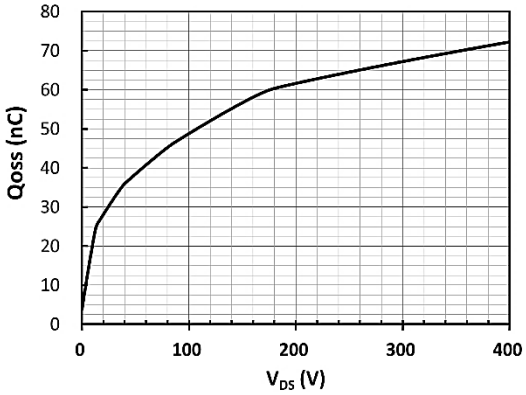


Fig 9. Source-drain diode forward characteristics

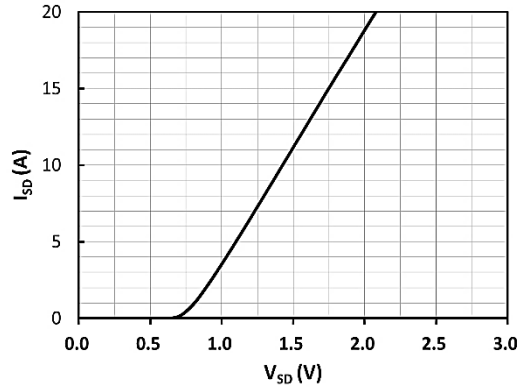
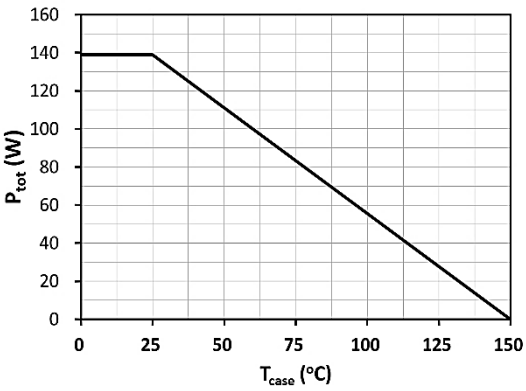
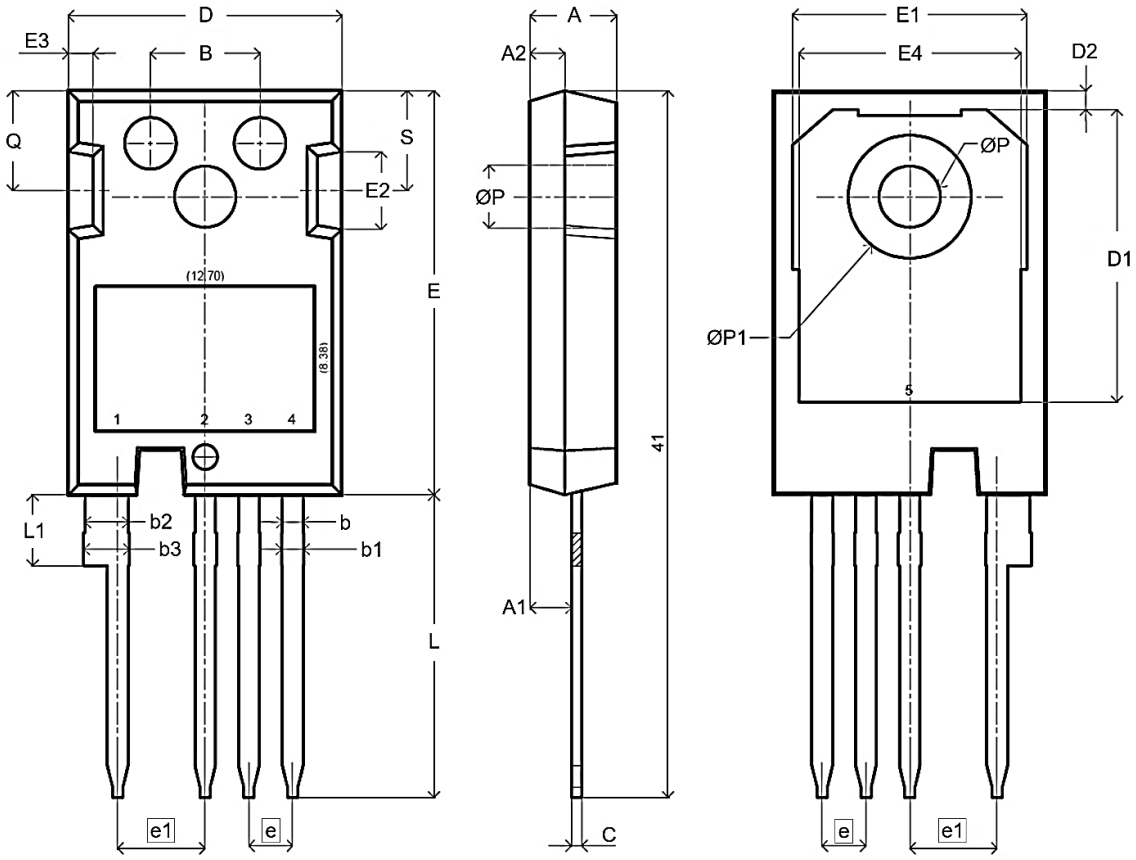


Fig 10. Power Dissipation Derating, Ptot



3- Package Outline Dimensions, GR-TO-247-4L

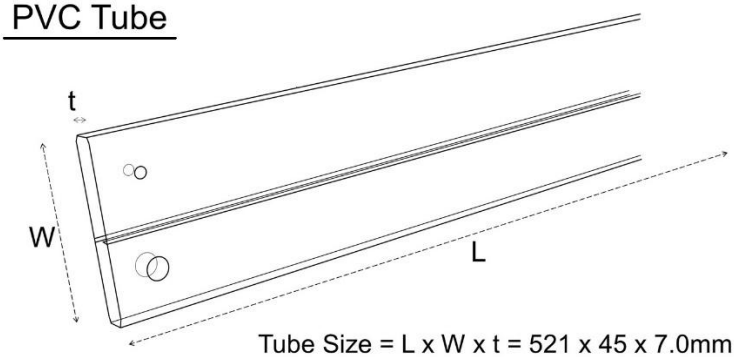


➢ **Table 4 Dimension of GR-TO-247-4L**

SYMBOL	DIMENSION (IN MM)			SYMBOL	DIMENSION (IN MM)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	4.80	5.02	5.24	E	23.20	23.45	23.70
A1	2.20	2.40	2.60	E1	13.10	13.60	14.10
A2	1.90	2.00	2.10	E2	4.30	4.50	4.70
B	6.10	6.35	6.60	E3	1.20	1.45	1.70
b	1.00	1.20	1.40	E4	12.5	12.9	13.3
b1	1.10	1.30	1.50	e	2.54 BSC		
b2	2.40	2.50	2.60	e1	5.08 BSC		
b3	2.50	2.65	2.80	L	40.5	40.95	41.4
C	0.50	0.60	0.70	L1	19.7	19.95	20.2
D	15.70	15.90	16.10	ΦP	3.40	3.60	3.80
D1	16.25	16.95	17.65	ΦP1	7.00	7.20	7.40
D2	0.95	1.10	1.25	S	6.00	6.15	6.30
-	-	-	-	Q	5.50	5.75	6.00

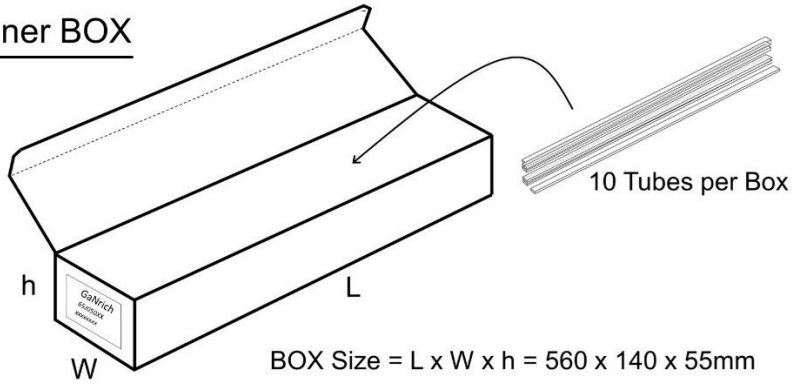
4- Tube Package Information

TO-247-3L, TO-247-4L
PVC Tube



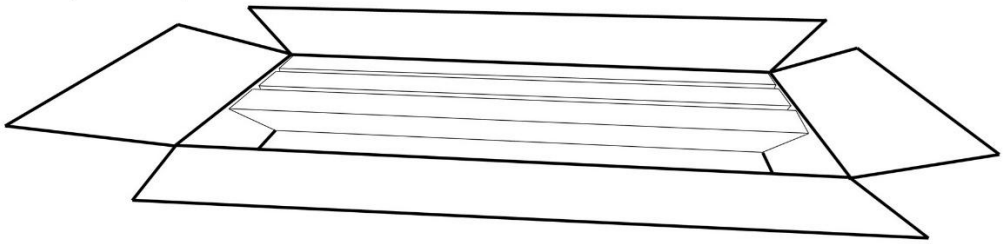
Tube Size = L x W x t = 521 x 45 x 7.0mm

Inner BOX



BOX Size = L x W x h = 560 x 140 x 55mm

Carton



Carton Size = 575 x 160 x 295mm

Package Type	Tube	Inner Box	Carton
TO-247-3L TO-247-4L	30 EA	300 EA	1500 EA
-	-	X10 Tube	X5 Box

5- Change Log

Version	Date	Description
01	Nov 28, 2023	Initial version
02	March 27, 2025	Electrical characteristics, Curve and Package information revised
03	April 16, 2026	Electrical characteristics revised

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