

GR-20E007UG: E-mode GaN Power Transistor

Description

GR-20E007UG is an enhancement mode GaN on Silicon power transistor. GR-20E007UG provides, high current and high operating speed which is suitable for DC to DC power supply applications.

Key Specifications

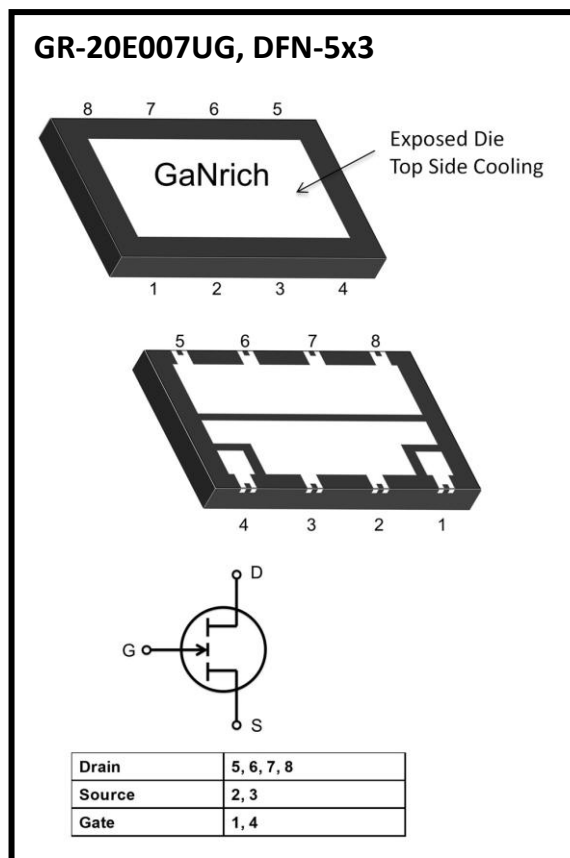
Part Number	GR-20E007UG
V _{DSS} , min.	200V
I _{DS} , Pulse (25°C, TPULSE = 300 μs)	104A
R _{DS(ON)} , typ. @V _{gs} =5V	7.3mΩ
Q _G , typ.	8.2nC

Features

- 200V enhancement mode power transistor
- High operating frequency
- R_{DS(on)} = Typ. 7.3 mΩ
- Dual-side cooled package
- HS compliant

Applications

- Switch Mode Power Supplies (SMPS)
- DC-DC Converters
- Fast Battery Charging
- Appliance Motor Drives



1. Electrical Characteristics

➤ **Table 1 Absolute maximum ratings**

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-source voltage	200	V
$V_{(TR)DSS}$	Transient drain to source voltage ^a	240	V
V_{GSS}	Gate- source voltage	-6V ~ +6V	V
I_D	Drain current (continuous) at $T_C = 25^\circ\text{C}$ operation	33.5	A
	Drain current (continuous) at $T_C = 100^\circ\text{C}$ operation	23.1	A
$I_{D,Pulse}$	Pulsed drain current (pulse width: 300 μs , $V_{gs}=5\text{V}$) ^b	104	A
T_J	Operating temperature	-40 to +150	$^\circ\text{C}$
T_S	Storage temperature	-40 to +150	$^\circ\text{C}$

- a. In off-state, spike duty cycle $D < 0.01$, spike duration $< 1\mu\text{s}$
 b. Defined by product design and characterization. Value is not tested to full current in production

➤ **Table 2 Thermal Characteristics**

Symbol	Parameter	Value	Unit
$R_{\theta JC_Top}$	Thermal resistance junction-case, Top	0.50	$^\circ\text{C}/\text{W}$
$R_{\theta JC_Bot}$	Thermal resistance junction-case, Bottom	0.50	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal resistance junction-ambient	60	$^\circ\text{C}/\text{W}$

- a. Tested in package DFN 5x3.

➤ **Table 3 Electrical Characteristics** ($T_{CASE} = 25\text{ }^{\circ}\text{C}$ unless otherwise stated)

Symbol	Parameter	Conditions	Values			Unit
			min.	typ.	max.	
V_{DSS}	Drain-source voltage	$V_{GS} = 0V, I_D = 250\mu A$	200	-	-	V
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 1mA$	0.8	1.1	1.6	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 6V, I_D = 20A$	-	7.3	9.5	$m\Omega$
I_{DSS}	Drain-source leakage current	$V_{DS} = 160V, V_{GS} = 0V$	-	5	400	μA
I_{GSS}	Gate-to-Source Forward Leakage current	$V_{GS} = +5V, T_J = 25^{\circ}\text{C}$	-	0.04	8.0	mA
	Gate-to-Source Forward Leakage current	$V_{GS} = +5V, T_J = 125^{\circ}\text{C}$	-	0.30	9.0	mA
	Gate-to-Source Reverse Leakage current	$V_{GS} = -4V, T_J = 25^{\circ}\text{C}$	-	1.0	30.0	μA
C_{ISS}	Input capacitance	$V_{DS} = 100V, V_{GS} = 0V$	-	452	-	pF
C_{OSS}	Output capacitance		-	220	-	
C_{RSS}	Reverse transfer capacitance		-	25.3	-	
Q_G	Gate charge	$V_{DS} = 100V, V_{GS} = 5V, I_D = 20A$	-	8.2	-	nC
Q_{GS}	Gate-source charge	$V_{DS} = 100V, I_D = 20A$	-	2.95	-	
Q_{GD}	Gate-drain charge		-	1.7	-	
Q_{OSS}	Output charge	$V_{DS} = 100V, V_{GS} = 0V$	-	18	-	
Q_{RR}	Reverse recovery charge	-	-	0	-	

2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

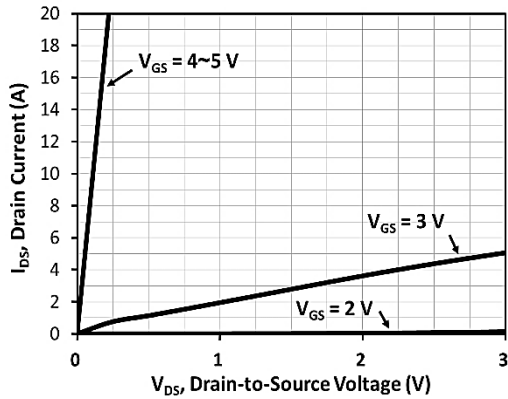


Fig 2. On-Resistance vs Drain Current and Temperature

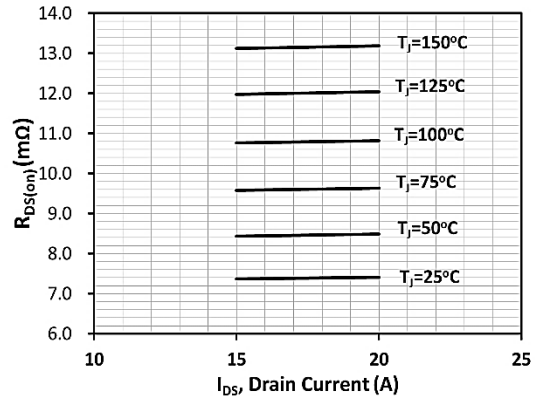


Fig 3. On-Resistance with Drain Current

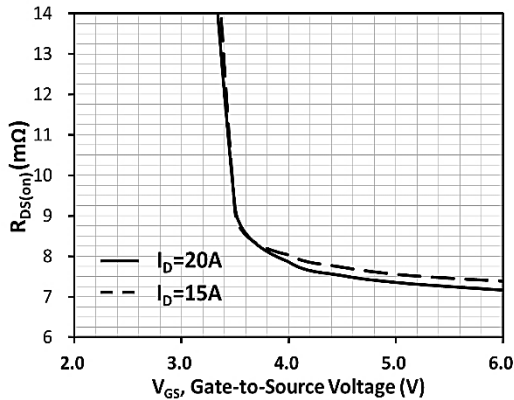


Fig 4. On-Resistance Variation with Temperature

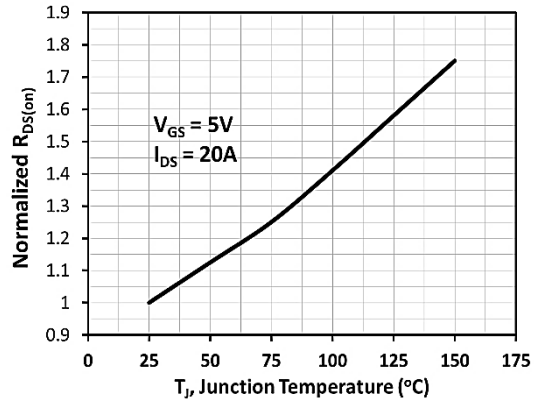


Fig 5. Threshold Voltage with Temperature

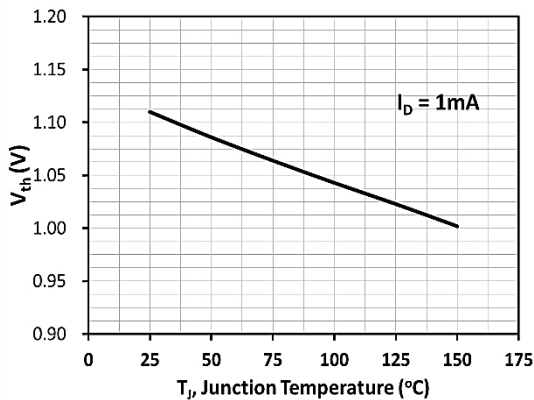


Fig 6. Capacitance Characteristics

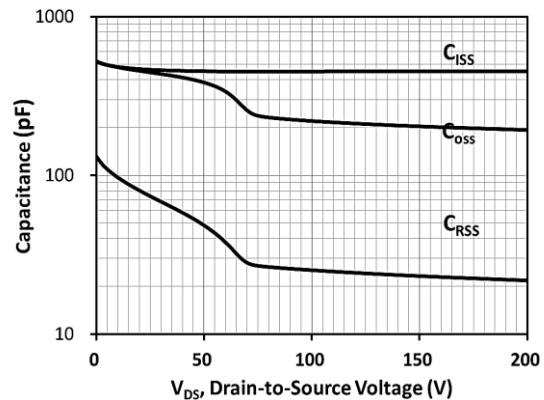


Fig 7. Gate Charge Characteristics, Qg

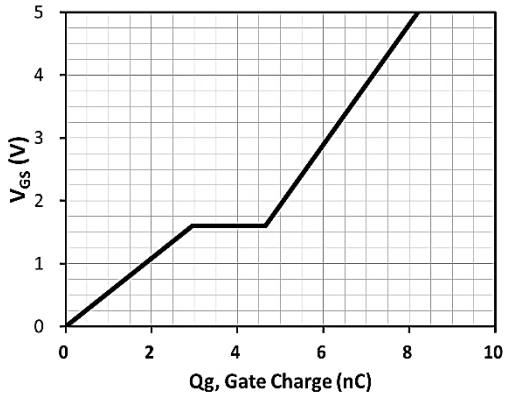
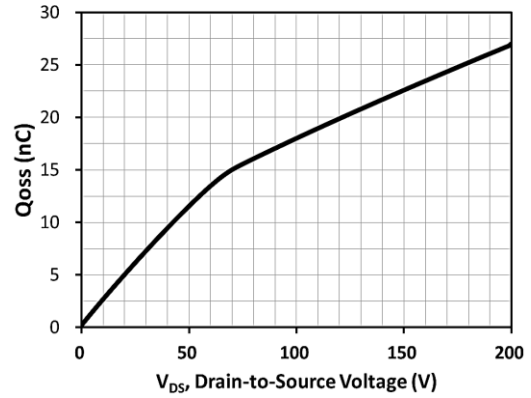
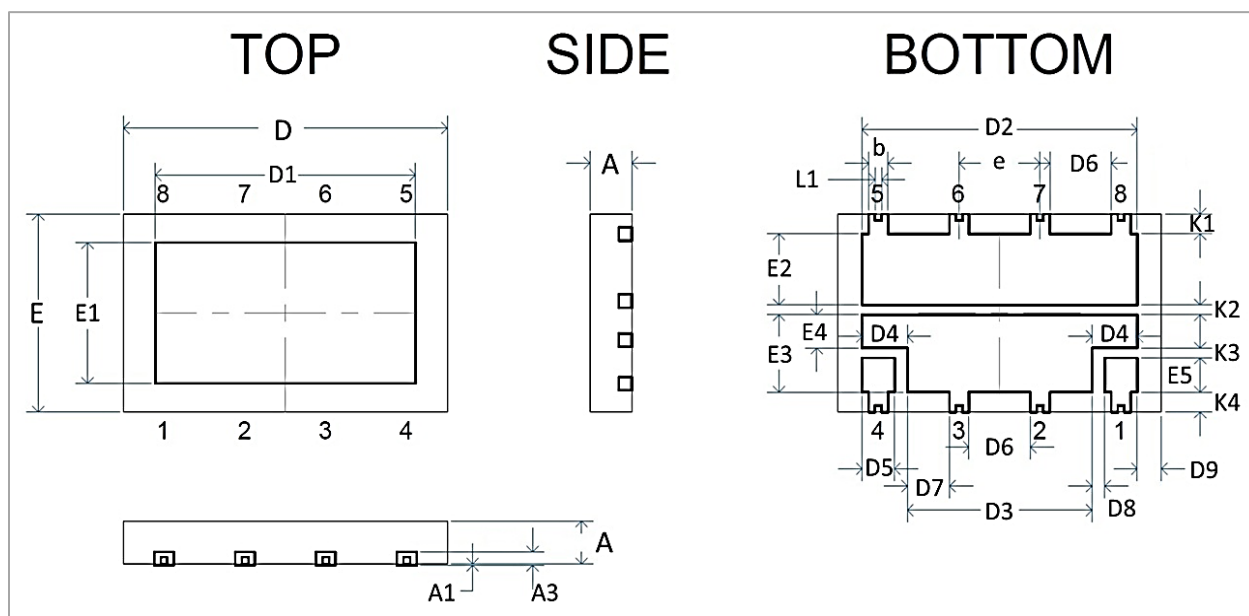


Fig 8. Capacitance Characteristics, Qoss



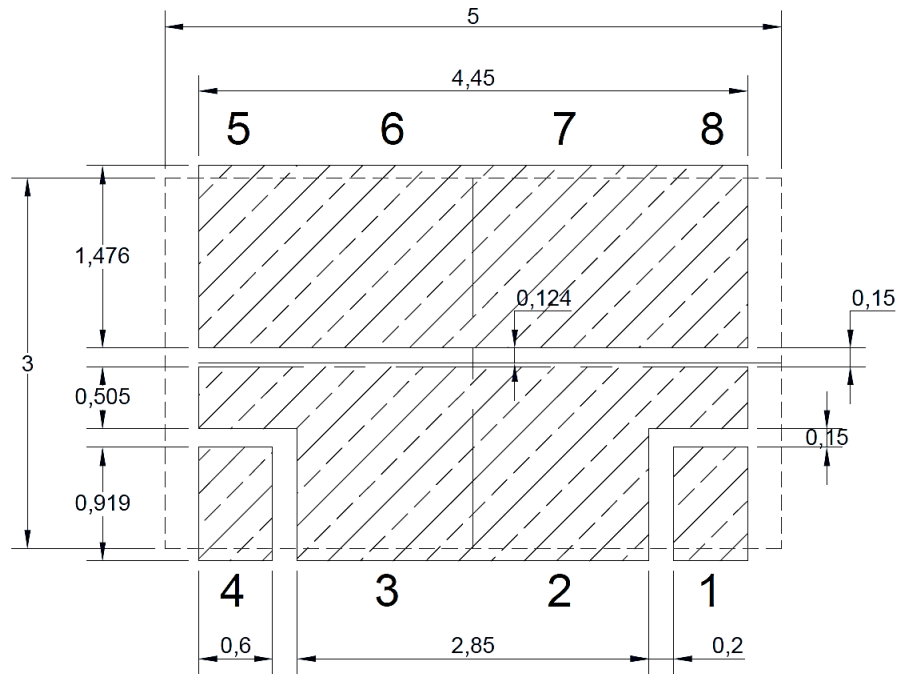
3. Package Outline Dimensions



➤ Table 4 Dimension of GR-DFN-5x3

SYMBOL	DIMENSION (MM)			SYMBOL	DIMENSION (IN MM)		
	MIN.	NOM.	MAX.		MIN.	NOM.	MAX.
A	0.60	0.65	0.70	D7	0.55	0.65	0.75
A2	--	0.02	0.05	D8	0.10	0.20	0.30
A3	0.203 REF			D9	0.365	0.375	0.385
D	4.90	5.00	5.10	E1	2.132 REF		
E	2.90	3.00	3.10	E2	0.976	1.076	1.176
e	1.25 BSC			E3	1.074	1.174	1.274
b	0.20	0.30	0.40	E4	0.405	0.505	0.605
D1	4.018 REF			E5	0.419	0.519	0.619
D2	4.15	4.25	4.35	K1	0.20	0.30	0.40
D3	2.75	2.85	2.95	K2	0.05	0.15	0.25
D4	0.60	0.70	0.80	K3	0.05	0.15	0.25
D5	0.40	0.50	0.60	K4	0.20	0.30	0.40
D6	0.85	0.95	1.05				

Recommended PCB Soldering footprint

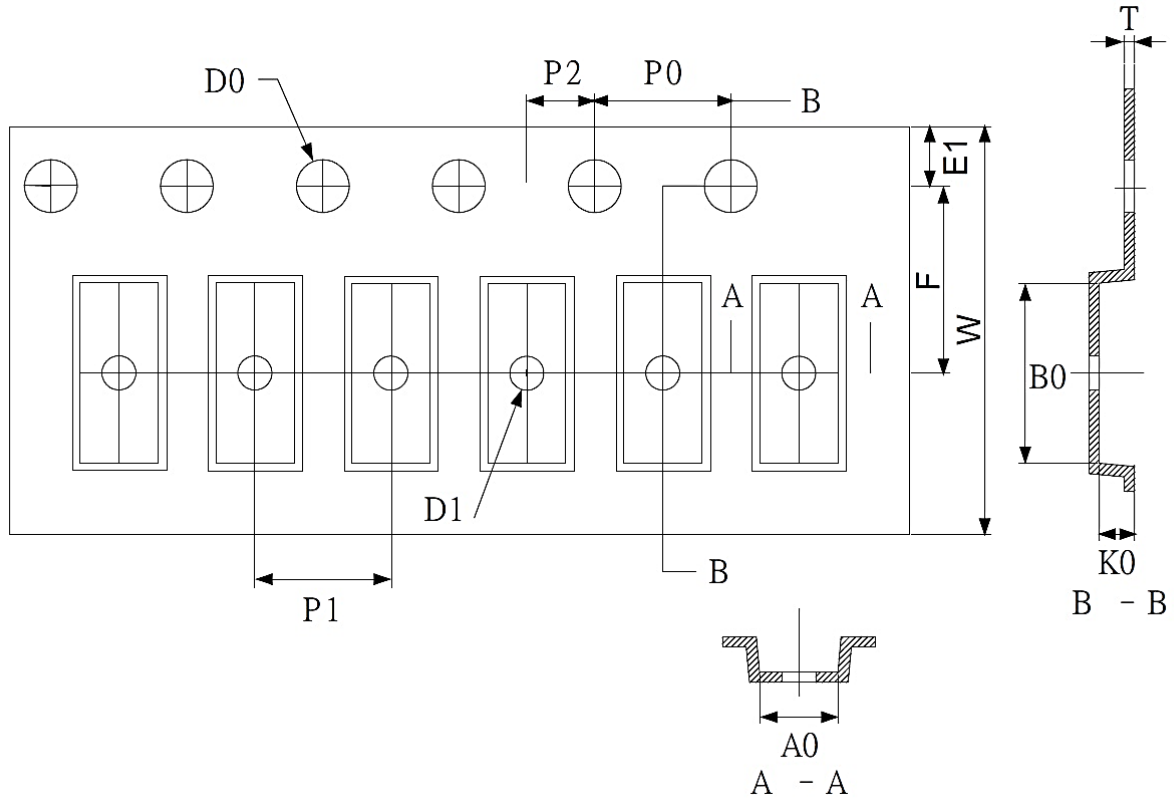


 Package outlines

 PCB pad openings

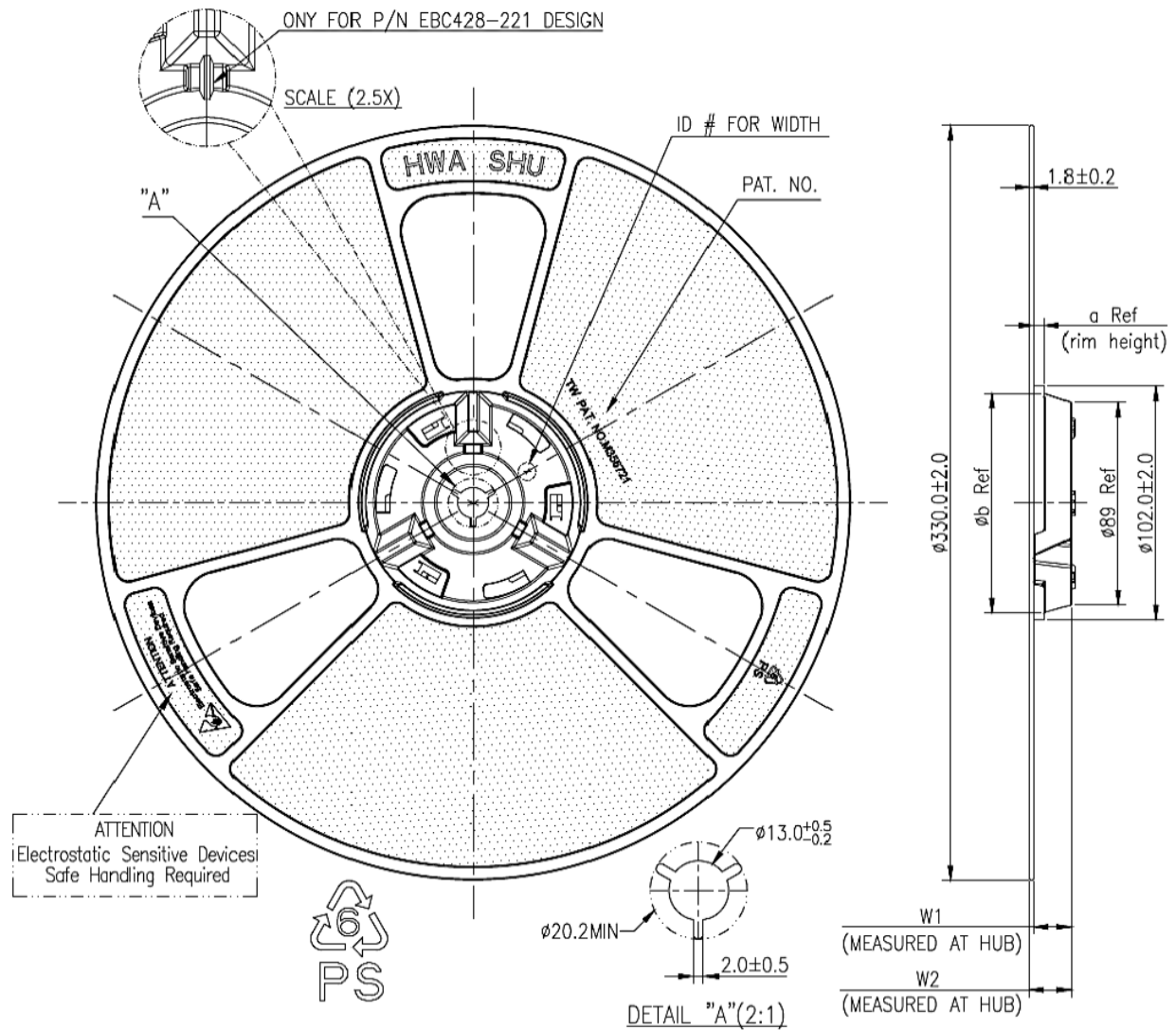
4. Tape & Reel Information

13" Reel, Carrier Tape W=12mm



Application	A	H	T1	C	d	D	W	E1	F
DFN 3x5_EP	180 ± 0.1	50 min.	13.2 ± 0.2	13.0 ± 0.2	1.5 min.	21.0 ± 0.4	12.0 ± 0.3	1.75 ± 0.1	5.5 ± 0.1
	P0	P1	P2	D0	D1	T	A0	B0	K0
Unit: mm	4.0 ± 0.1	4.0 ± 0.1	2.0 ± 0.05	1.55 ± 0.1	1.0 ± 0.1	0.3 ± 0.05	2.3 ± 0.2	5.3 ± 0.2	1.0 ± 0.1

13" Reel, Carrier Tape W=12mm



5. Change Log

Version	Date	Description
0.1	Feb 05, 2025	Initial version
0.2	SEPT 26, 2025	Electrical characteristics, Curve information revised.
0.3	Apr 16, 2026	Electrical characteristics revised.

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