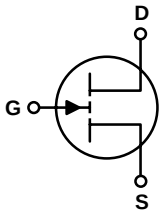
INN100FQ025A

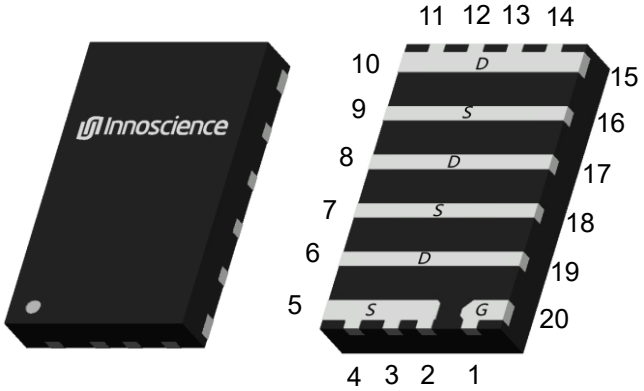
1. General description

GaN-on-Silicon enhancement mode high-electron-mobility-transistor (HEMT) in FCQFN with 3.0 mm x 5.0 mm package size.



2. Features

- GaN-on-Silicon E-mode HEMT technology
- Very low gate charge
- Ultra-low on resistance
- Very small footprint



3. Applications

- High frequency DC-DC converter
- BMS protection
- RF envelope tracking
- PC charger
- Mobile power bank
- Motor driver

4. Key performance parameters

Table 1 Key performance parameters at T_J = 25 °C

Parameter	Value	Unit
$V_{DS,max}$	100	V
$R_{DS(on),max}$ @ V_{GS} = 5 V	2.8	mΩ
$Q_{G,typ}$ @ V_{DS} = 50V	14	nC
$I_{DS,Pulse}$	320	A
Q_{OSS} @ V_{DS} = 50V	85	nC

5. Pin information

Table 2 Pin information

Pin	Pin description	Pin function
1,20	Gate	Driver Gate
2-5,7,9,16,18	Source	Source
6,8,10-15,17,19	Drain	Power Drain

Table 3 Ordering information

Type/Ordering Code	Package	Product Code
INN100FQ025A	FCQFN 3X5	J22

Table of contents

6. Maximum ratings

at T_J = 25 °C unless otherwise specified.

Continuous application of maximum ratings can deteriorate transistor lifetime. For further information, contact Innoscience sales office.

Table 4 Maximum ratings

SYMBOL	PARAMETER	MAX	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	100	V
I_D	Continuous current	80	A
	Pulsed (25˚C, T_{Pulse} = 100 µs)	320	A
V_{GS}	Gate-to-Source Voltage	6	V
	Gate-to-Source Voltage	-4	V
T_J	Operating Temperature	-40 to 150	˚C
T_{STG}	Storage Temperature	-40 to 150	˚C

7. Thermal characteristics

Table 5 Thermal characteristics

SYMBOL	PARAMETER	TYP	UNIT
$R_{\theta JC}$	Thermal Resistance, Junction to Case	14.15	˚C/W
$R_{\theta JB}$	Thermal Resistance, Junction to Board	1.89	˚C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient [1]	61.06	˚C/W

Note 1: $R_{\theta JA}$ is determined with the device mounted on one square inch of copper pad, single layer 2 oz copper on FR4 board.

8. Electric characteristics

at T_J = 25 °C, unless specified otherwise

Table 6 Static characteristics

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT	TEST CONDITIONS
BV_{DSS}	Drain-to-Source Voltage	100	-	-	V	V_{GS} = 0 V, I_D = 600 μA
I_{DSS}	Drain Source Leakage	-	12	24	uA	V_{GS} = 0 V, V_{DS} = 80 V
I_{GSS}	Gate-to-Source Forward Leakage	-	2.5	9	uA	V_{GS} = 5 V
	Gate-to-Source Reverse Leakage	-	0.3	0.5	uA	V_{GS} = -4 V
$V_{GS(TH)}$	Gate Threshold Voltage	0.8	1.1	2.5	V	V_{DS} = V_{GS}, I_D = 13 mA
$R_{DS(on)}$	Drain-Source On-state Resistance	-	2.2	2.8	mΩ	V_{GS} = 5 V, I_D = 30 A
V_{SD}	Source-Drain Forward Voltage	-	1.5	-	V	I_S = 0.5 A, V_{GS} = 0 V

Table 7 Dynamic characteristics

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT	TEST CONDITIONS
C_{ISS}	Input Capacitance	-	1500	-	pF	V_{GS} = 0 V, V_{DS} = 50 V
C_{OSS}	Output Capacitance	-	700	-		V_{GS} = 0 V, V_{DS} = 50 V
C_{RSS}	Reverse Transfer Capacitance	-	12.5	-		V_{GS} = 0 V, V_{DS} = 50 V
$C_{OSS(ER)}$	Energy Related C_{OSS}	-	1150	-		V_{GS} = 0 V, V_{DS} = 0 V to 50 V
$C_{OSS(TR)}$	Time Related C_{OSS}	-	1600	-		V_{GS} = 0 V, V_{DS} = 0 V to 50 V
R_G	Gate resistance	-	1.8	-	Ω	f = 5 MHz, open drain
Q_G	Total Gate Charge	-	14	-	nC	V_{GS} = 5 V, V_{DS} = 50 V, I_D=30 A
Q_{GS}	Gate to Source Charge	-	2.8	-		V_{DS} = 50 V, I_D=30 A
Q_{GD}	Gate to Drain Charge	-	3	-		V_{DS} = 50 V, I_D=30 A
$Q_{G(TH)}$	Gate Charge at Threshold	-	1.5	-		V_{DS} = 50 V, I_D=30 A
Q_{OSS}	Output Charge	-	85	-		V_{GS} = 0 V, V_{DS} = 50 V

9. Electric characteristics diagrams

at T_J = 25 °C, unless specified otherwise

Fig. 1 Typical Output Characteristics (T_J=25°C)

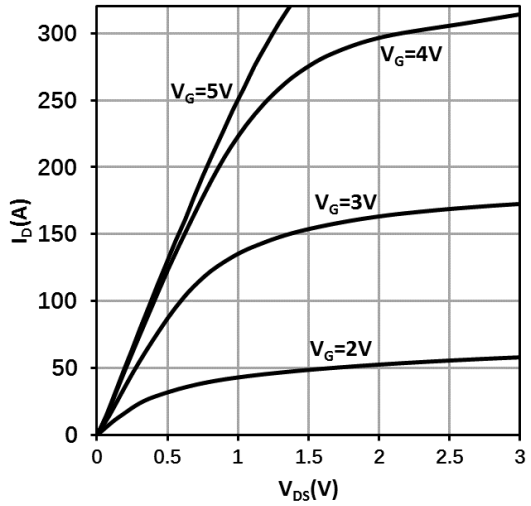


Fig. 2 Typical Output Characteristics (T_J=125°C)

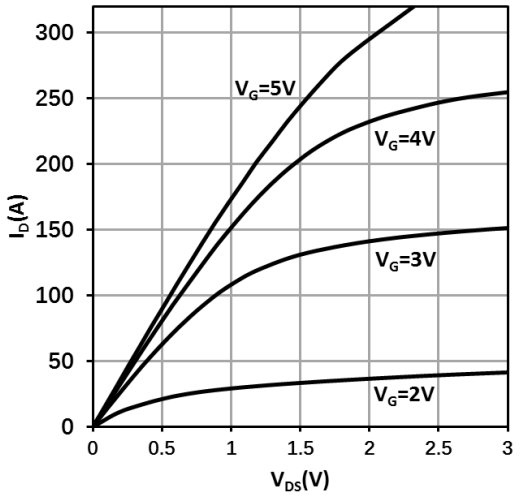


Fig.3 Typical Drain On-state Resistance (T_J=25°C)

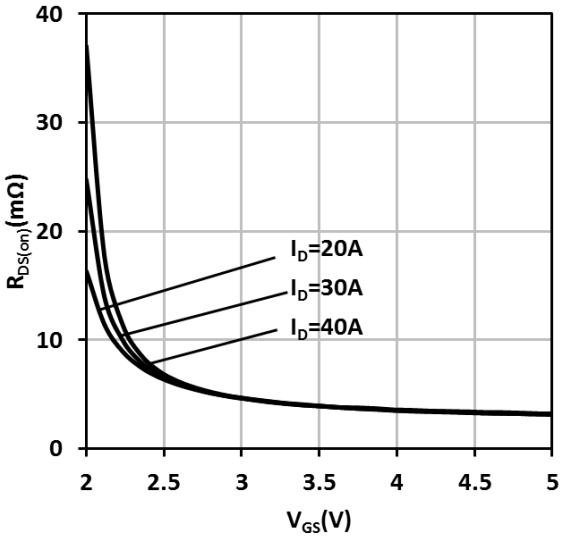


Fig. 4 Typical Drain On-state Resistance (T_J=125°C)

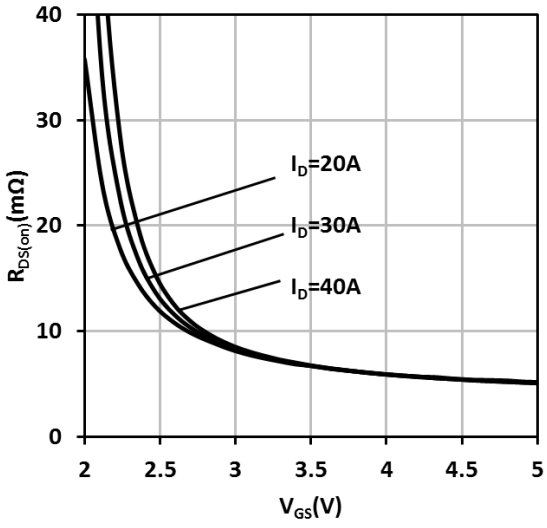


Fig. 5 Normalized On-State Resistance vs. Temp.

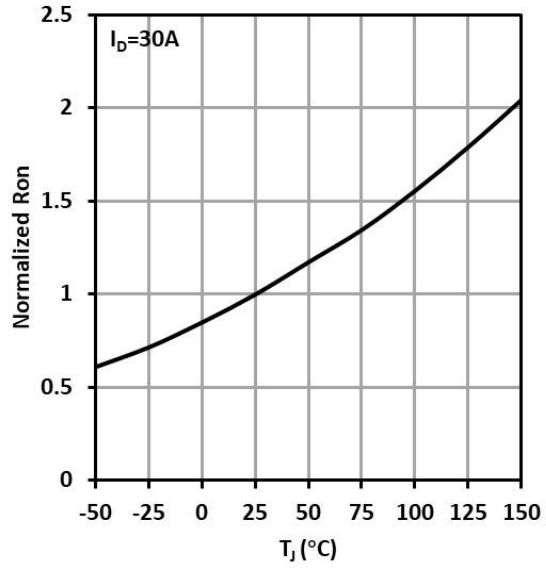


Fig. 6 Typical Transfer Characteristics

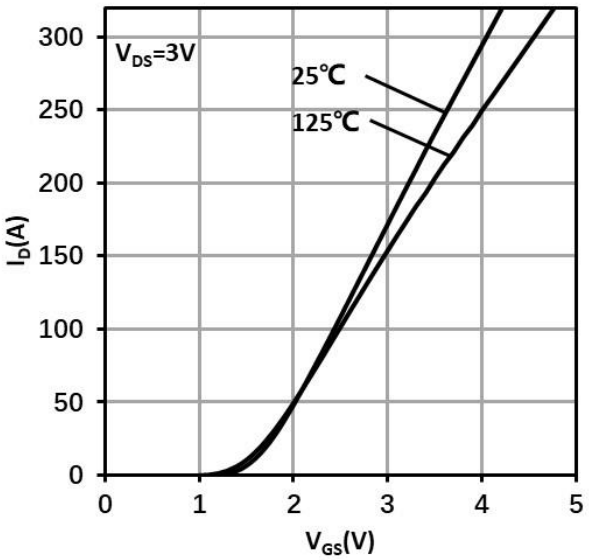


Fig. 7 Typ. Reverse Drain-Source Characteristics (V_{GS}≤0,T_J =25°C)

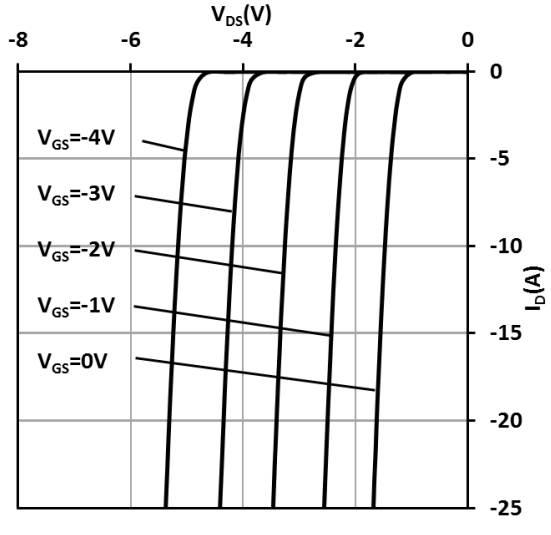


Fig. 8 Typ. Reverse Drain-Source Characteristics (V_{GS}≥0,T_J =25°C)

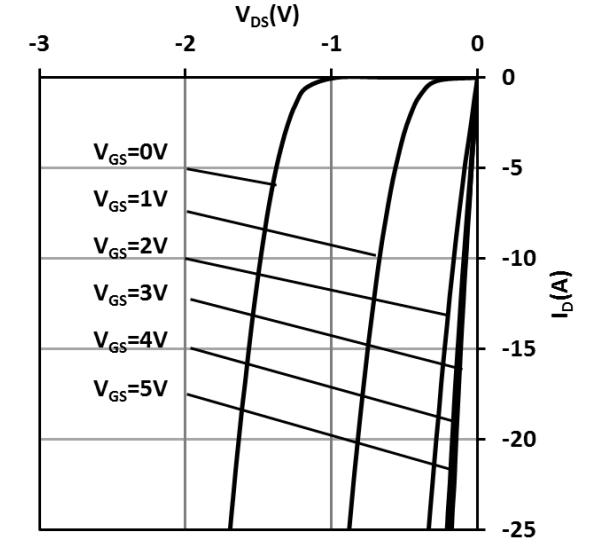


Fig. 9 Typ. Reverse Drain-Source Characteristics (V_{GS}≤0, T_J = 125 °C)

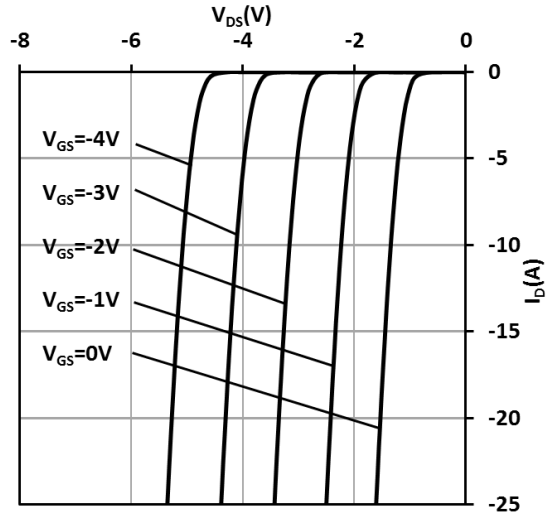


Fig. 10 Typ. Reverse Drain-Source Characteristics (V_{GS}≥0, T_J = 125 °C)

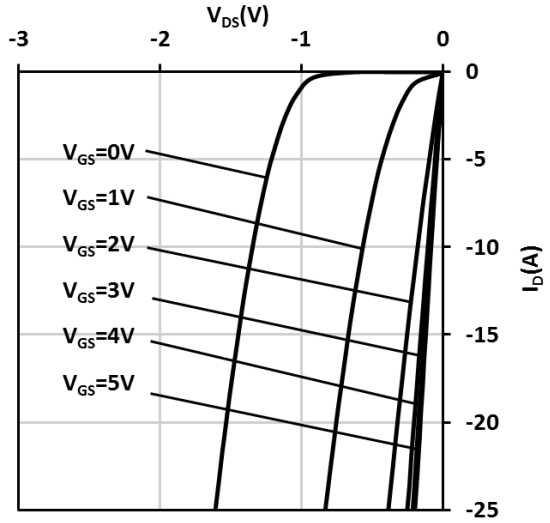


Fig. 11 Typ. Capacitances Characteristics

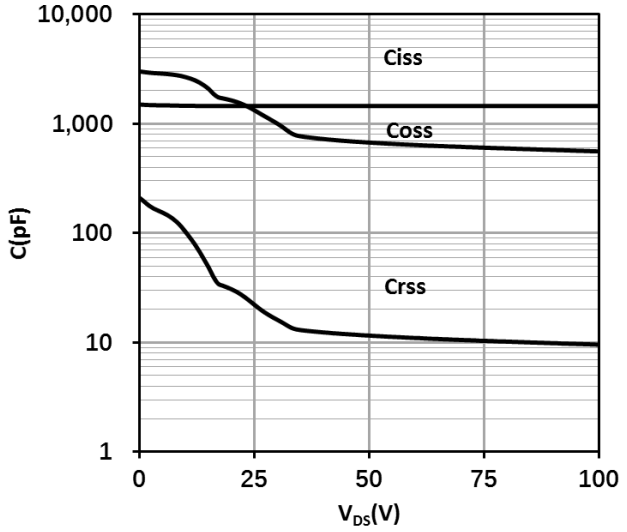


Fig. 12 Typ. Gate Charge

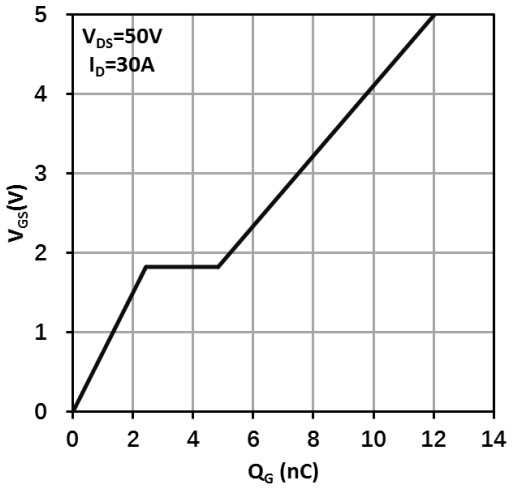


Fig. 13 Normalized Threshold Voltage vs. Temp.

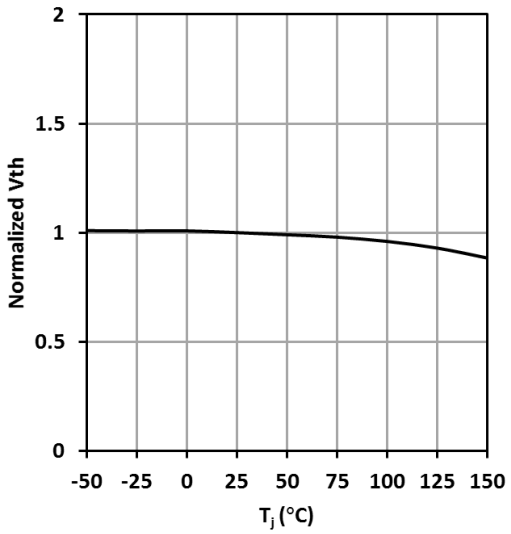


Fig. 14 Output Charge

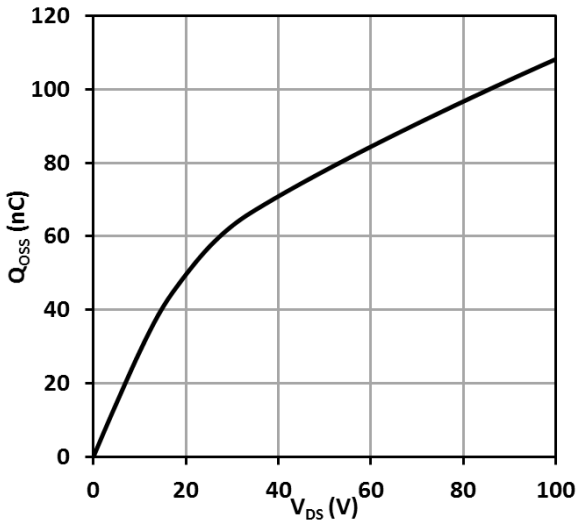


Fig. 15 Output Capacitance Stored Energy

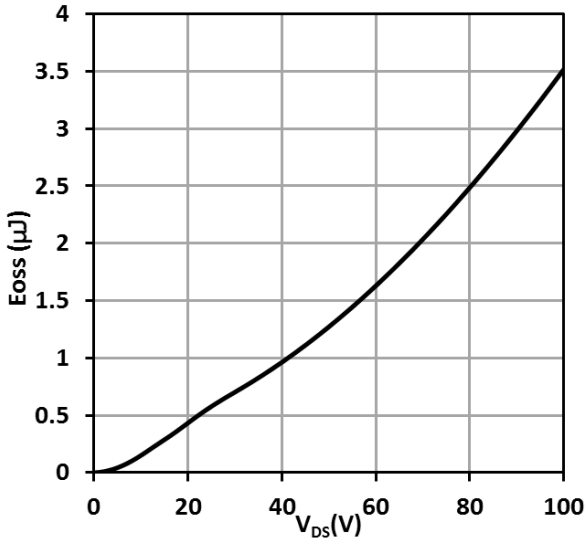


Fig. 16 Power Dissipation

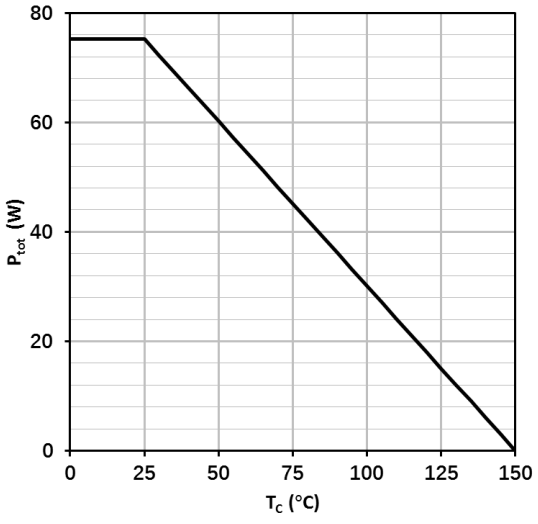


Fig. 17 Safe Operating Area

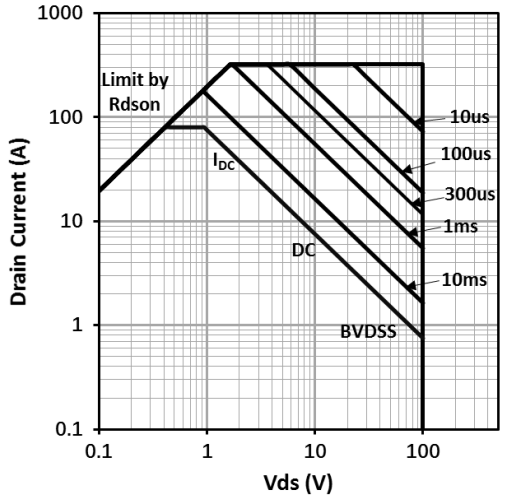
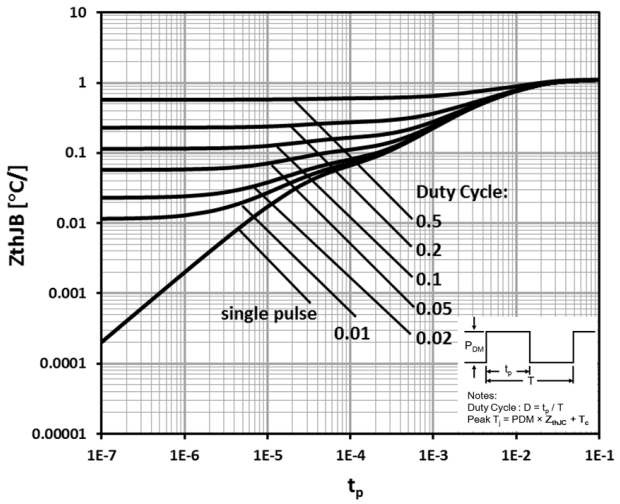
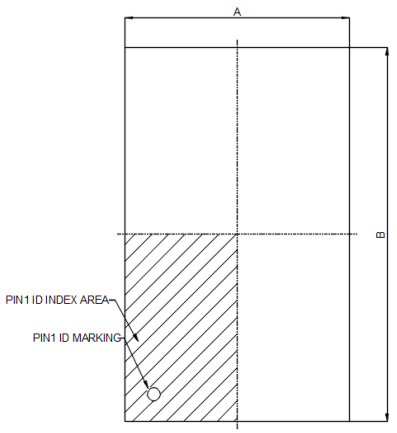


Fig. 18 Max. Transient Thermal Impedance

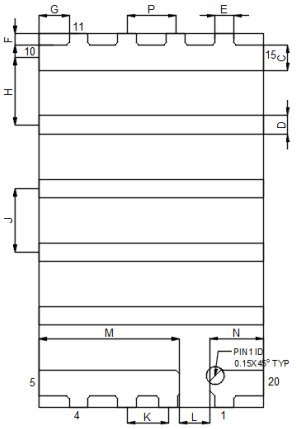


10. Package Outlines

Package Reference

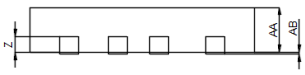


TOP VIEW



BOTTOM VIEW

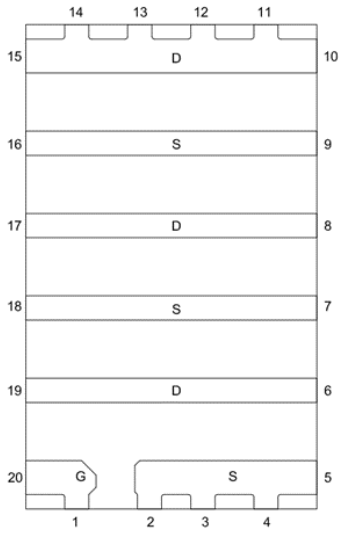
SYMBOL	MILLIMETER			NOTE
	MIN	NOM	MAX	
A	2.90	3.00	3.10	
B	4.90	5.00	5.10	
C	0.30	0.35	0.40	3X
D	0.20	0.25	0.30	4X
E	0.20	0.25	0.30	8X
F	0.15 REF			3X
G	0.40 REF			4X
H	0.90 BASIC			2X
J	0.85 BASIC			3X
K	0.55 BASIC			
P	0.65 BASIC			4X
L	0.35	0.40	0.45	
M	1.775	1.875	1.975	
N	0.625	0.725	0.825	
Z	0.203 REF			
AA	0.65	0.75	0.85	
AB	0.00	0.02	0.05	



SIDE VIEW

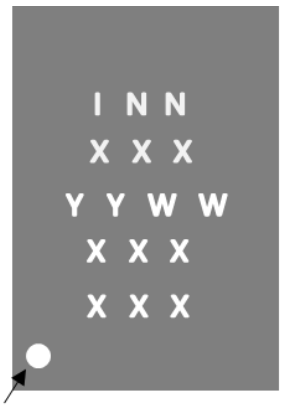
NOTE:
1)ALL DIMENSION ARE IN MILLIMETERS.
2)BOTTOM VIEW IS FT TESTER SIDE VIEW.
3)LEAD COPLANARITY SHALL BE 0.08 MILLIMETERS MAX.
4)COMPLIES WITH JEDEC MO-220.
5)DRAWING IS NOT TO SCALE.

Pin Information



TOP VIEW

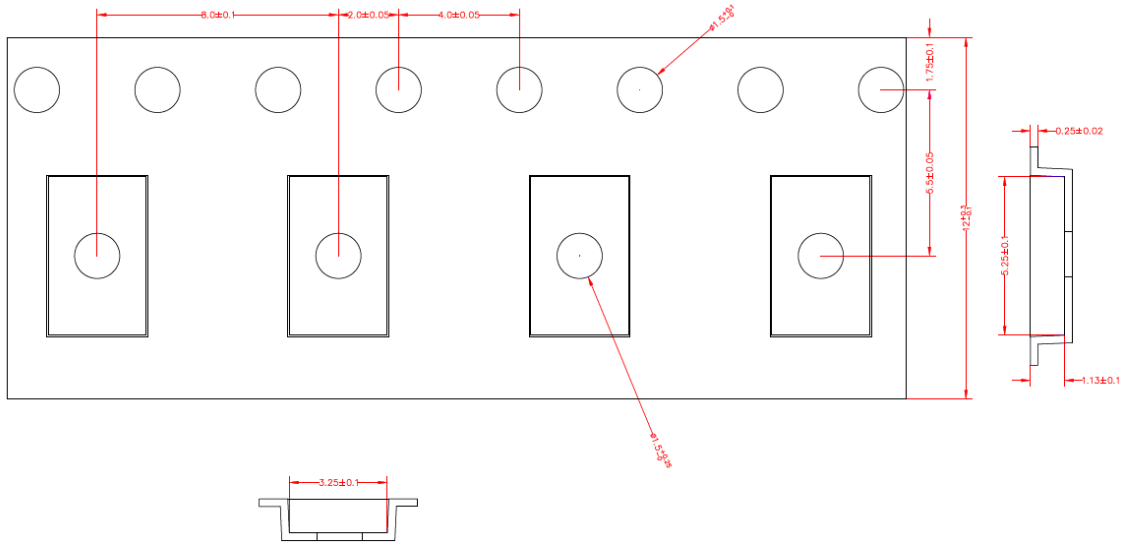
Marking Reference：



Die Orientation Dot
&Gate Position

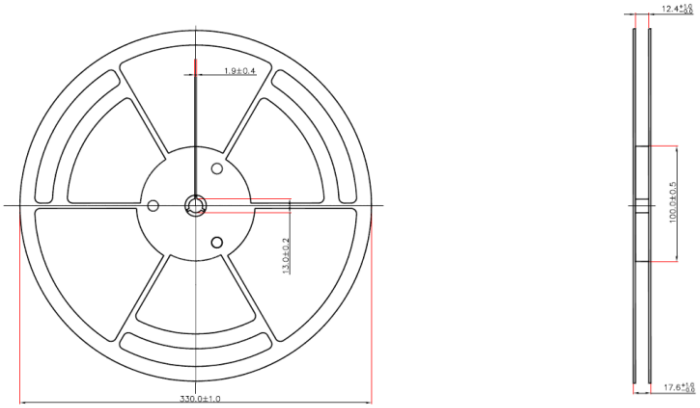
Row	Description	Example
Row 1	Company name	INN
Row 2	Product code	XXX
Row 3	Date code	YYWW
Row 4	Lot No	XXX
Row 5	Lot No	XXX

11. Reel information



NOTES:

1. CARRIER TAPE COLOR: BLACK.
2. COVER TAPE WIDTH: 9.5±0.10.
3. COVER TAPE COLOR: TRANSPARENT.
4. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.20 MAX.
5. CAMBER NOT TO EXCEED 1MM IN 100MM.
6. MOLD# 3 X 5 X 0.85
7. ALL DIMS IN MM.
8. BAN TO USE THE ENVIRONMENT-RELATED SUBSANCES OF JCET PRESCRIBING.

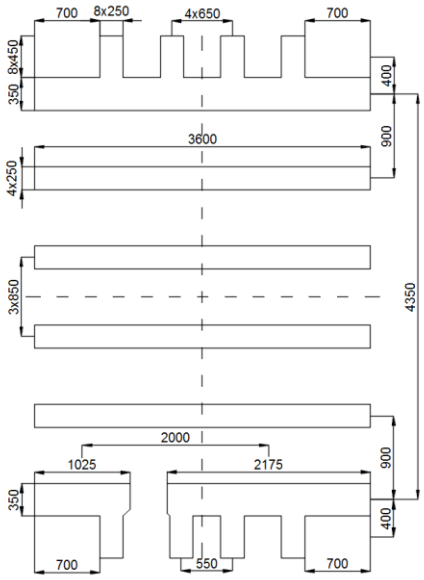


NOTES:

1. COLOR: BLUE.
2. ALL DIM IN mm.
3. GENERAL TOLERANCE±0.25.
4. BAN TO USE THE ENVIRONMENT-RELATED SUBSANCES OF JCET PRESCRIBING.

12. Land pattern

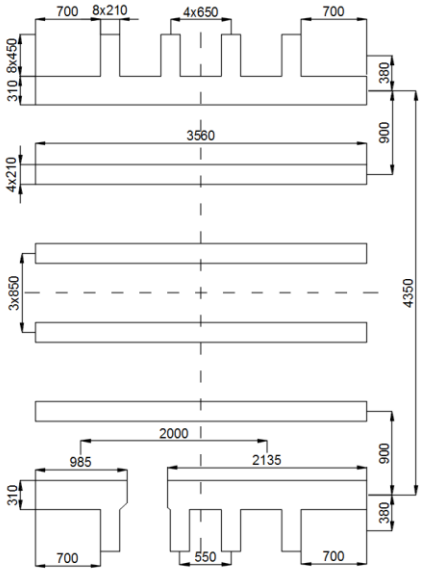
Recommended land pattern



Unit: μm

TOP VIEW

Recommended Stencil drawing



Unit: μm

TOP VIEW

13. Revision history

Major changes since the last revision

Revision	Date	Description of changes
1.0	2023-07-19	Version 1.0 release

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