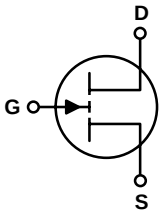
INN030EQ015A

1. General Description

GaN-on-Silicon enhancement mode high-electron-mobility-transistor (HEMT) in En-FCQFN with 5 mm x 4 mm package size.

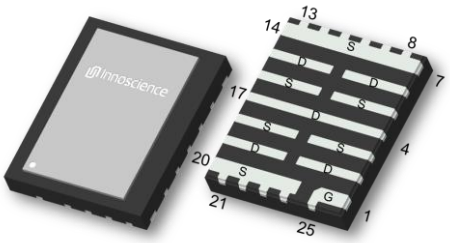
2. Features



- GaN-on-Silicon E-mode HEMT technology
- Very low gate charge
- Ultra-low on resistance
- Zero reverse recovery charge
- Exposed die for top-side thermal optimization

3. Applications

- High frequency DC-DC converter
- Battery charger
- Battery management system
- Notebook
- Industry



Top View Bottom View

4. Key Performance Parameters

Table 1 Key Performance Parameters at T_J = 25 °C

Parameter	Value	Unit
$V_{DS,max}$	30	V
$R_{DS(on),max}$ @ V_{GS} = 5 V	1.5	mΩ
$Q_{G,typ}$ @ V_{DS} = 15V	22.8	nC
$I_{DS,Pulse}$ (T_J = 25˚C)	300	A
Q_{OSS} @ V_{DS} = 15V	43	nC

5. Pin Information

Table 2 Pin Information

Pin	Pin description	Pin function
1, 25	Gate	Driver Gate
3, 5, 7-14, 16, 18, 20-24	Source	Source
2, 4, 6, 15, 17, 19	Drain	Power Drain

Table 3 Ordering Information

Type/Ordering Code	Package	Product Code
INN030EQ015A	En-FCQFN 5mm x 4mm	C12

Table of Contents

6. Maximum Ratings

at T_J = 25 °C unless otherwise specified.

Exceeding the maximum ratings may destroy the device. For further information, contact Innoscience sales office.

Table 4 Maximum Ratings

SYMBOL	PARAMETER	MAX	UNIT
V_{DS}	Drain-to-Source Voltage (Continuous)	30	V
I_D	Continuous Current (V_{GS} = 5 V, T_C = 25 ˚C)	183	A
	Continuous Current (V_{GS} = 5 V, T_C = 100 ˚C)	116	A
	Continuous Current (V_{GS} = 5 V, T_A = 25 ˚C, $R_{\theta JA}$ = 53 ˚C/W)	30	A
	Pulsed Current (V_{GS} = 5 V, T_A = 25 ˚C, T_{Pulse} = 300 µs)	300	A
V_{GS}	Gate-to-Source Voltage	6	V
	Gate-to-Source Voltage	-4	V
P_{tot}	Power Dissipation (T_C = 25 ˚C)	87	W
	Power Dissipation (T_A = 25 ˚C)	2.4	W
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	Note/Test Condition
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Top	0.35	˚C/W	
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Bottom	1.43	˚C/W	
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient [1]	53	˚C/W	
T_{sold}	Maximum Reflow Soldering Temperature	260	˚C	MSL3

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 otherwise specified.

Table 6 Static Characteristics

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT	TEST CONDITIONS
I_{DSS}	Drain Source Leakage	-	10	100	μA	V_{GS} = 0 V, V_{DS} = 24 V
	Drain Source Leakage (125 °C)	-	100	1000	μA	V_{GS} = 0 V, V_{DS} = 24 V
I_{GSS}	Gate-to-Source Forward Leakage	-	6	60	μA	V_{GS} = 5 V
	Gate-to-Source Forward Leakage (125 °C)	-	60	600	μA	V_{GS} = 5 V
	Gate-to-Source Reverse Leakage	-	30	300	μA	V_{GS} = -4 V
$V_{GS(TH)}$	Gate Threshold Voltage	0.9	-	2.1	V	V_{DS} = V_{GS}, I_D = 5 mA
$R_{DS(on)}$	Drain-Source On-state Resistance [2]	-	1.2	1.5	mΩ	V_{GS} = 5 V, I_D = 15 A
V_{SD}	Source-Drain Forward Voltage	-	1.65	-	V	I_S = 0.5 A, V_{GS} = 0 V

Note 2: $R_{DS(on)}$ is measured without prior drain bias or switching stress.

Table 7 Dynamic Characteristics [3]

SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT	TEST CONDITIONS
C_{ISS}	Input Capacitance	-	3.4	-	nF	V_{GS} = 0 V, V_{DS} = 15 V
C_{OSS}	Output Capacitance	-	1.8	-		V_{GS} = 0 V, V_{DS} = 15 V
C_{RSS}	Reverse Transfer Capacitance	-	0.1	-		V_{GS} = 0 V, V_{DS} = 15 V
$C_{OSS(ER)}$	Energy Related C_{OSS}	-	2.5	-		V_{GS} = 0 V, V_{DS} = 0 V to 15 V
$C_{OSS(TR)}$	Time Related C_{OSS}	-	2.8	-		V_{GS} = 0 V, V_{DS} = 0 V to 15 V
R_G	Gate resistance	-	1.6	-	Ω	f = 1 MHz
Q_G	Total Gate Charge	-	22.8	-	nC	V_{GS} = 5 V, V_{DS} = 15 V, I_D=15 A
Q_{GS}	Gate to Source Charge	-	5.5	-		V_{DS} = 15 V, I_D=15 A
Q_{GD}	Gate to Drain Charge	-	3.2	-		V_{DS} = 15 V, I_D=15 A
$Q_{G(TH)}$	Gate Charge at Threshold	-	3.8	-		V_{DS} = 15 V, I_D=15 A
Q_{OSS}	Output Charge	-	43	-		V_{GS} = 0 V, V_{DS} = 15 V

Note 3: Defined by design. Not subject to production test.

9. Electric Characteristics Diagrams

at T_J = 25 °C, unless specified otherwise

Figure 1 Typical Output Characteristics (T_J=25°C)

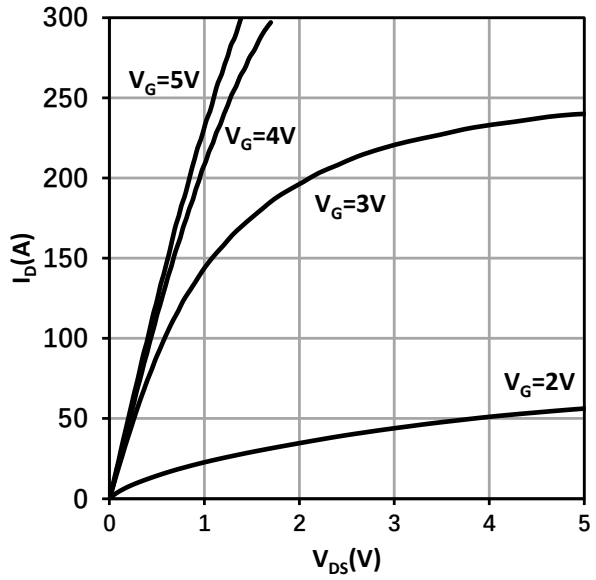


Figure 2 Typical Output Characteristics (T_J=125°C)

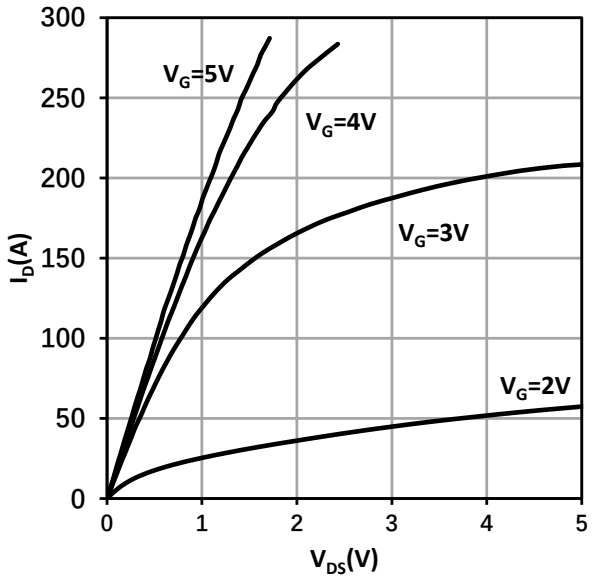


Figure 3 Typical On-state Resistance (T_J=25°C)

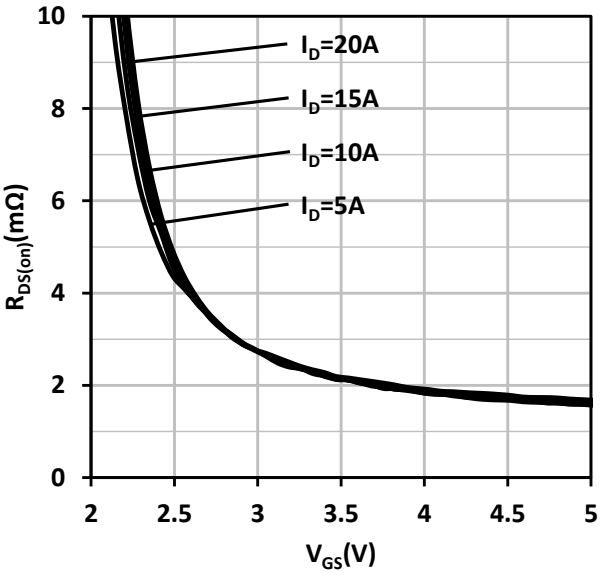


Figure 4 Typical On-state Resistance (T_J=125°C)

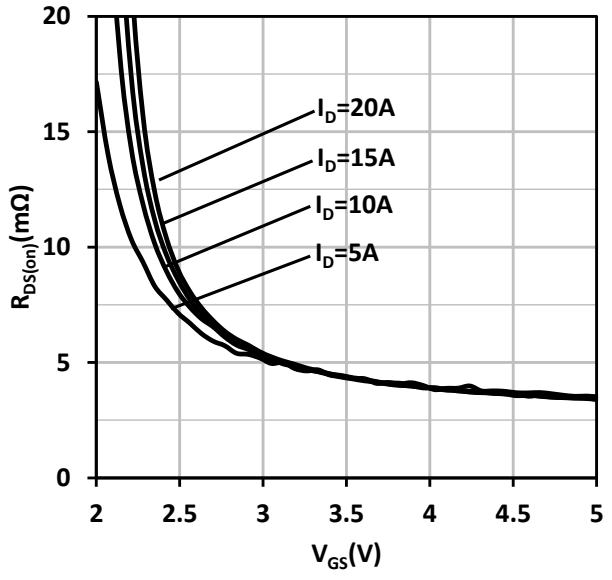


Figure 5 Normalized On-State Resistance vs. Temp.

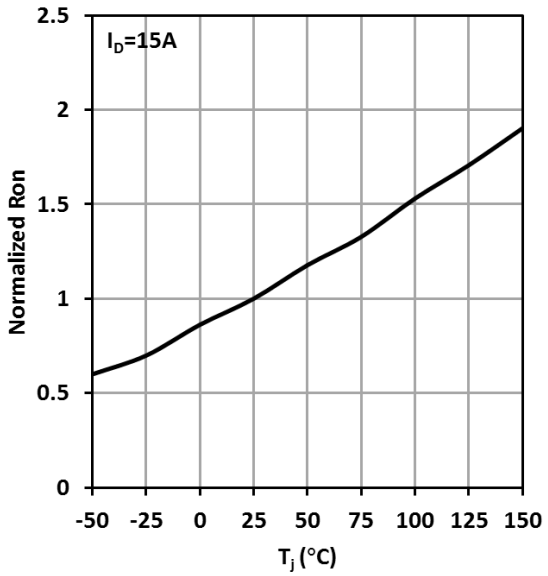


Figure 6 Typical Transfer Characteristics

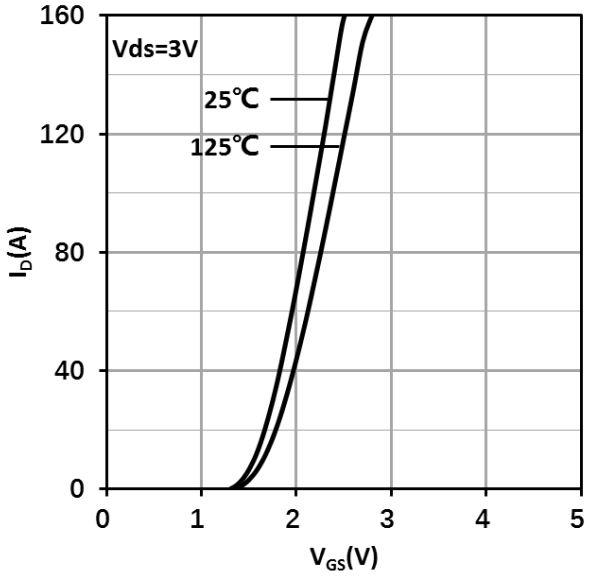


Figure 7 Typical Reverse Characteristics
($V_{GS}\leqslant 0, T_J$=25°C)

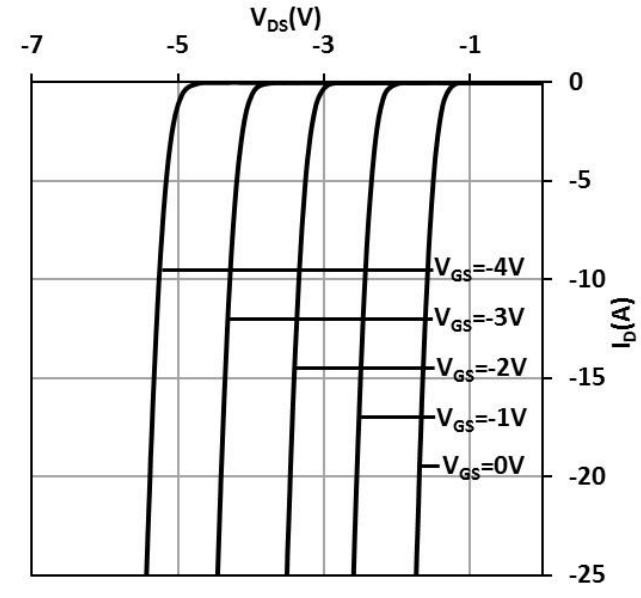


Figure 8 Typical Reverse Characteristics
($V_{GS}\geqslant 0, T_J$=25°C)

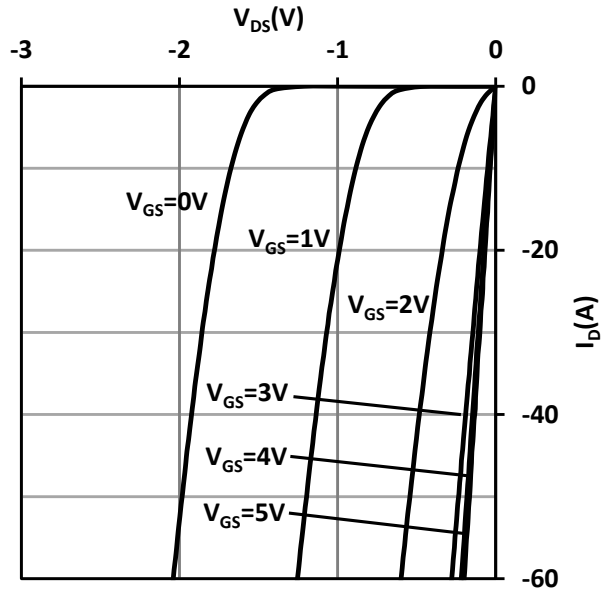


Figure 9 Typical Reverse Characteristics ($V_{GS}\leqslant 0, T_J=125°C$)

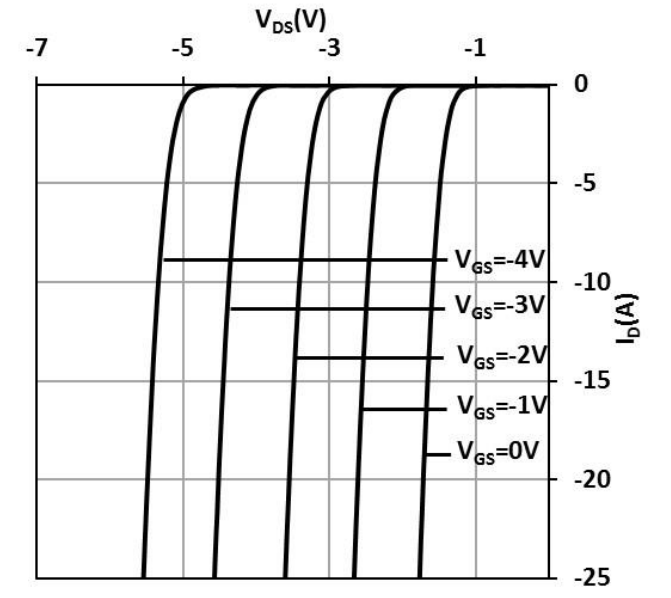


Figure 10 Typical Reverse Characteristics ($V_{GS}\geqslant 0, T_J=125°C$)

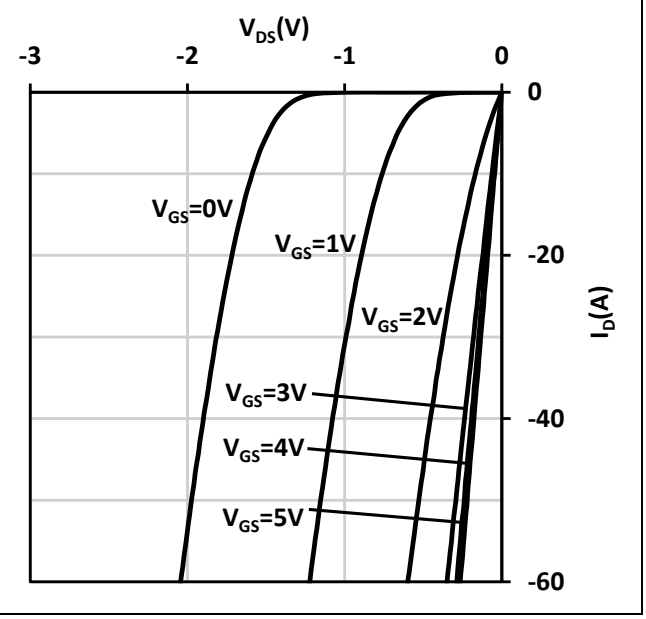


Figure 11 Typical Capacitances Characteristics

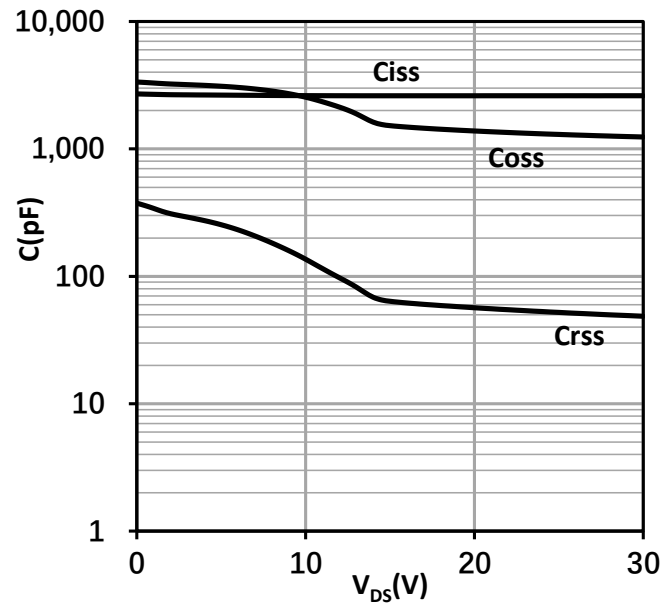


Figure 12 Typical Gate Charge

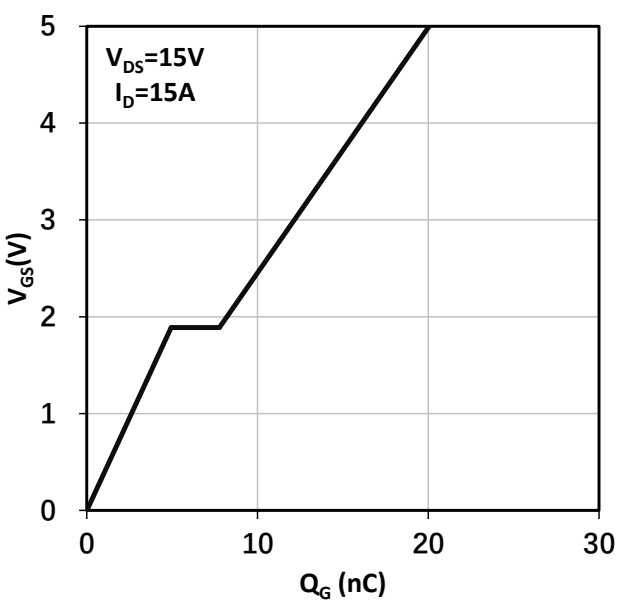


Figure 13 Normalized Threshold Voltage vs. Temp.

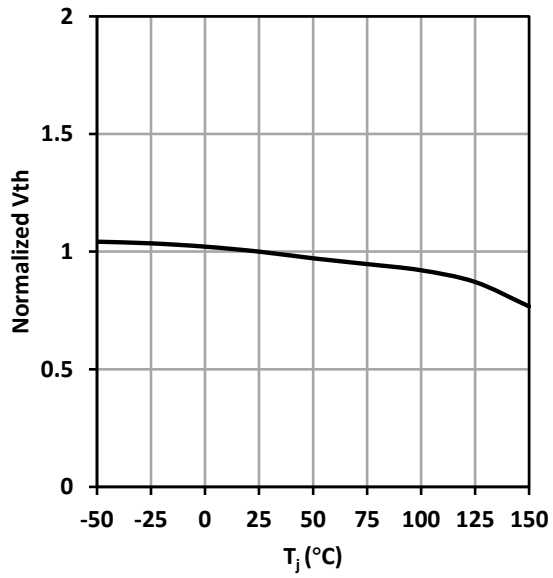


Figure 14 Output Charge

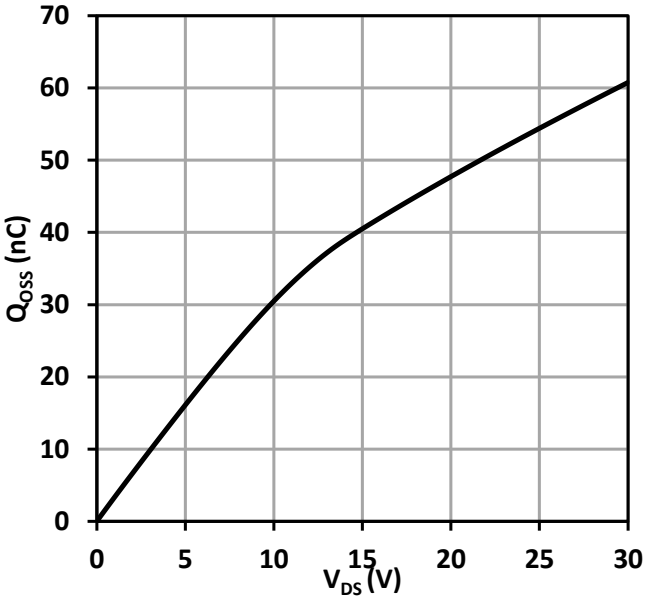


Figure 15 Output Capacitance Stored Energy

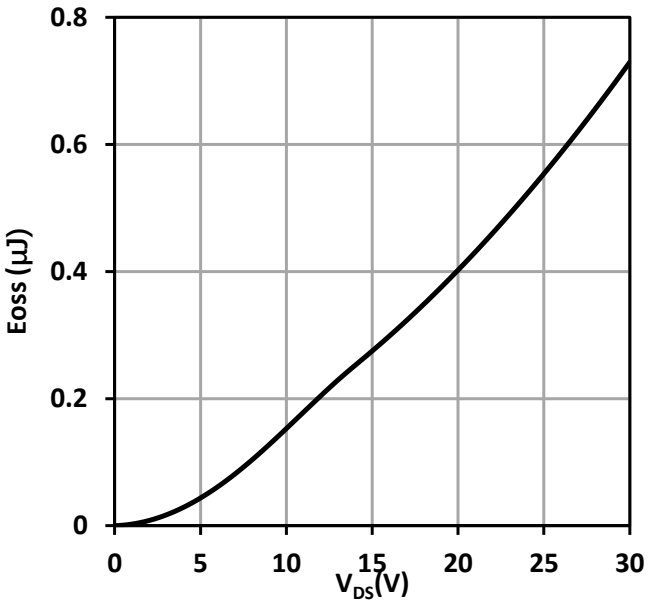


Figure 16 Power Dissipation

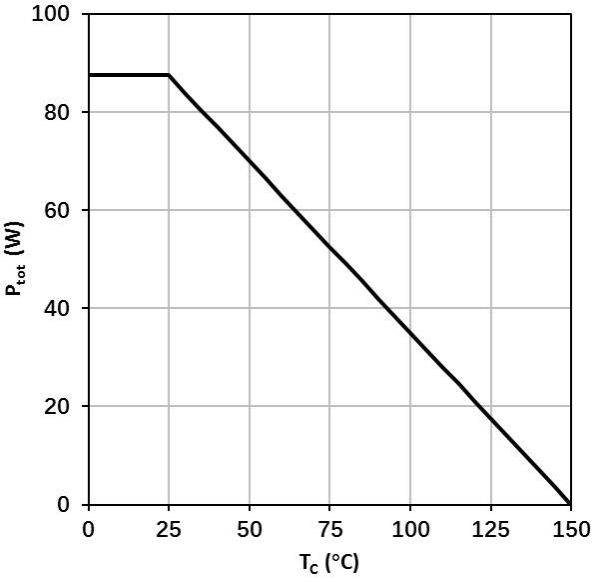
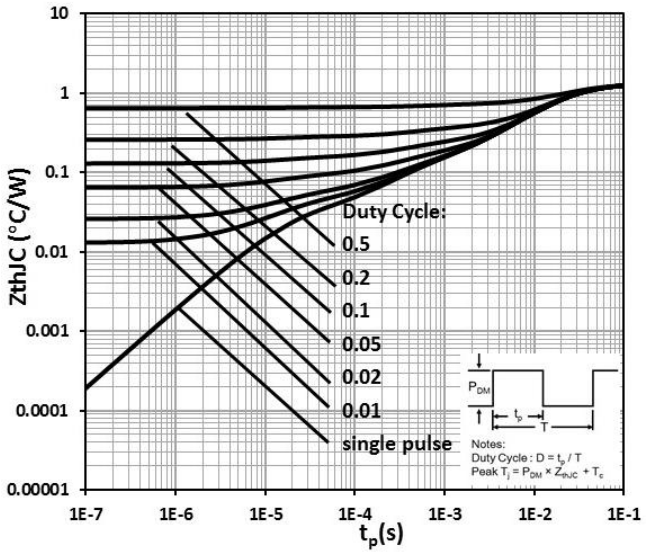
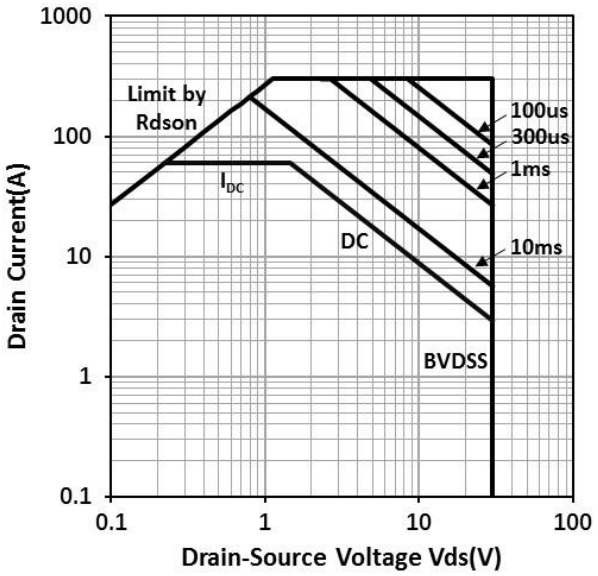


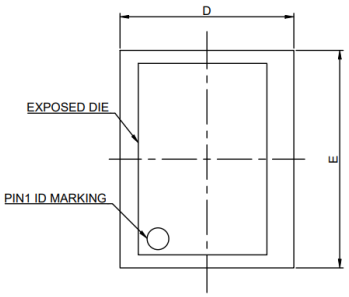
Figure 17 Safe Operating Area	Figure 18 Max. Transient Thermal Impedance



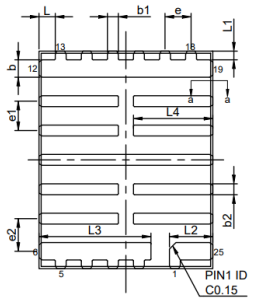


10. Package Outlines

Package Reference

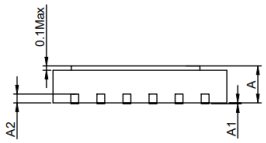


TOP VIEW



BOTTOM VIEW

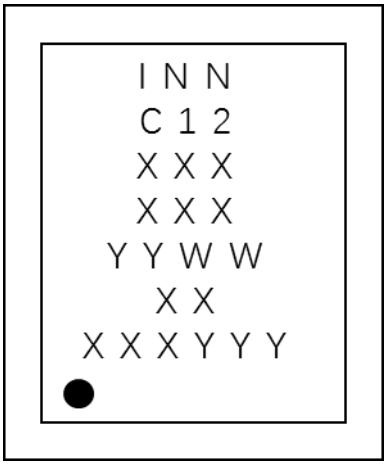
SYMBOL	MILLIMETER			NOTE
	MIN	NOM	MAX	
D	3.900	4.000	4.100	
E	4.900	5.000	5.100	
b	0.350	0.400	0.450	4X
b1	0.200	0.250	0.300	11X
b2	0.200	0.250	0.300	10X
e	0.600 BASIC			8X
e1	0.675 BASIC			8X
e2	0.750 BASIC			4X
L	0.375 REF			3X
L1	0.200 REF			3X
L2	0.899	0.999	1.099	
L3	2.477	2.577	2.677	
L4	1.725	1.825	1.925	8X
L5	0.010	-	0.090	
A	0.750	0.850	0.950	
A1	0.000	0.020	0.050	
A2	0.203 REF			
A3	0.060	-	0.180	



SIDE VIEW

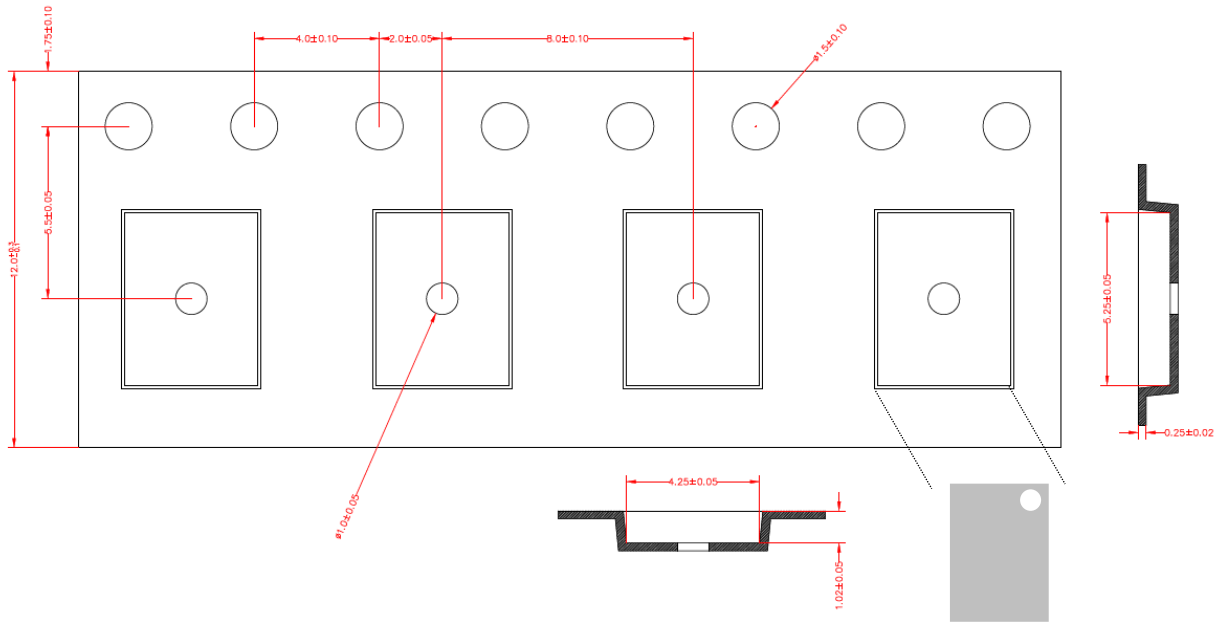
NOTE:
1) ALL DIMENSIONS ARE IN MILLIMETERS.
2) LEAD COPLANARITY SHALL BE 0.08MILLIMETERS MAX.
3) JEDEC REFERENCE IS MO-220.
4) DRAWING IS NOT TO SCALE.

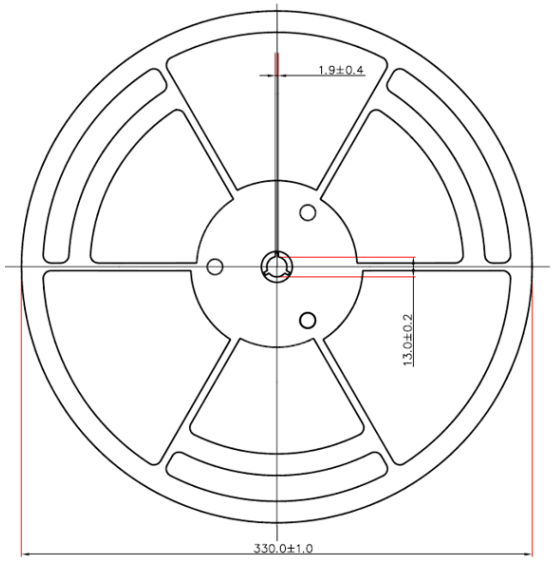
Marking Reference

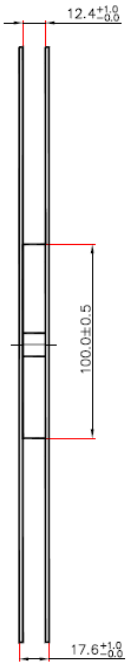


Row	Description	Example
Row1	Company Name	INN
Row2	Product Code	XXX
Row3	Lot Code	XXX
Row4		XXX
Row5	Date Code	YYWW
Row6	Wafer ID	XX
Row7	Location ID	XXXYYY

11. Reel Information



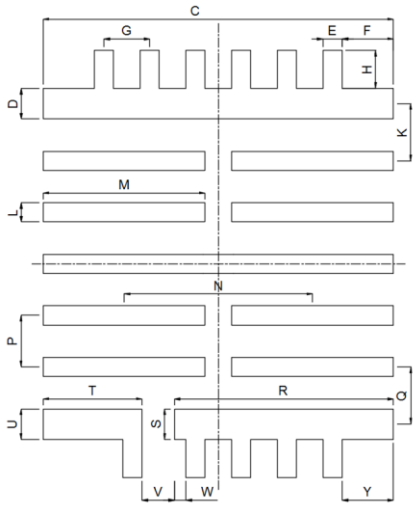




All dimension are in millimeters.

12. Land Pattern

Recommended Land Pattern



TOP VIEW

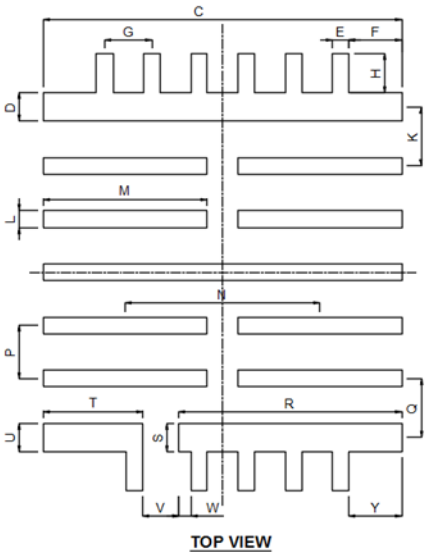
SYMBOL	MILLIMETER NOM	NOTE
C	4.600	
D	0.400	
E	0.250	11X
F	0.675	2X
G	0.600	8X
H	0.500	11X
K	0.750	2X
L	0.250	10X
M	2.125	8X
N	2.475	4X
P	0.675	8X
Q	0.750	2X
R	2.875	
S	0.400	
T	1.299	
U	0.400	
V	0.425	
W	0.152	
Y	0.675	

NOTE:

1) LAND PATTERN IS SOLDER MASK DEFINED.

2) IT IS RECOMMENDED TO HAVE ON-CU TRACE PCB VIAS.

Recommended Stencil Drawing



TOP VIEW

SYMBOL	MILLIMETER NOM	NOTE
C	4.560	
D	0.360	
E	0.210	11X
F	0.675	2X
G	0.600	8X
H	0.500	11X
K	0.750	2X
L	0.210	10X
M	2.085	8X
N	2.475	4X
P	0.675	8X
Q	0.750	2X
R	2.835	
S	0.360	
T	1.259	
U	0.360	
V	0.465	
W	0.152	
Y	0.675	

13. Revision History

Major changes since the last revision

Revision	Date	Description of changes
1.0	2025-05-12	1.0 Version Setup

Important Notice

The information provided in this document is intended as a guide only and shall not in any event be regarded as a guarantee of conditions, characteristics or performance. Innoscience does not assume any liability arising out of the application or use of any product described herein, including but not limited to any personal injury, death, or property or environmental damage. No licenses, patent rights, or any other intellectual property rights is granted or conveyed. Innoscience reserves the right to modify without notice.