



QNHCHIP

QND100N02AJ

# Product Specification

QND100N02AJ

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20V N-Channel MOSFET



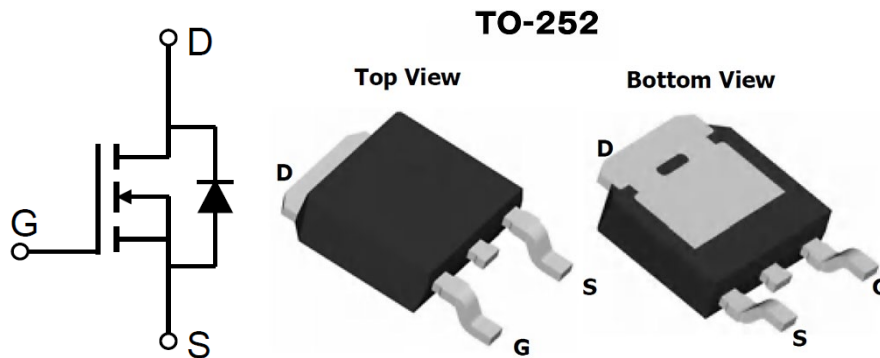
## FEATURES

- 20V,90A  
 $R_{DS(ON)}$  Typ. = 3.1m $\Omega$  @  $V_{GS}$  = 4.5V  
 $R_{DS(ON)}$  Typ. = 4.2m $\Omega$  @  $V_{GS}$  = 2.5V
- Lead free and Green Device Available
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead Free

## Applications

- Load Switch
- PWM Application
- Power Management

## Pin Description



NO.	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE



## Absolute Maximum Ratings

(@  $T_C = 25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Value	Units	
$V_{DS}$	Drain-to-Source Voltage	20	V	
$V_{GS}$	Gate-to-Source Voltage	$\pm 12$	V	
$I_D$	Continuous Drain Current	$T_C = 25^\circ\text{C}$	90	A
		$T_C = 100^\circ\text{C}$	57	
$I_{DM}$	Pulsed Drain Current <sup>(1)</sup>	360	A	
$E_{AS}$	Single Pulsed Avalanche Energy <sup>note2</sup>	156	mJ	
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	54	W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <sup>(2)</sup>	32	$^\circ\text{C}/\text{W}$	
$R_{\theta JC}$	Thermal Resistance, Junction to Case <sup>(3)</sup>	2.32	$^\circ\text{C}/\text{W}$	
$T_J, T_{STG}$	Junction & Storage Temperature Range	-55 to 150	$^\circ\text{C}$	



## Electrical Characteristics

(T<sub>J</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250A, V <sub>GS</sub> =0V	20	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V	-	-	1.0	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> = ±12V	-	-	±100	nA
<b>On Characteristics</b>						
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250A	0.5	0.9	1.0	V
R <sub>DS(ON)</sub>	Static Drain-Source ON-Resistance <sup>(4)</sup>	V <sub>GS</sub> =4.5V, I <sub>D</sub> =30A	-	3.1	3.6	mΩ
		V <sub>GS</sub> =2.5V, I <sub>D</sub> =20A	-	4.2	4.9	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =10V, f=1MHz	-	3476	-	pF
C <sub>oss</sub>	Output Capacitance		-	528	-	pF
C <sub>rss</sub>	Reverse Transfer Capacitance		-	464	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>GS</sub> =0~8V, V <sub>DS</sub> =10V, I <sub>D</sub> =30A	-	65	-	nC
Q <sub>gs</sub>	Gate Source Charge		-	8	-	nC
Q <sub>gd</sub>	Gate Drain("Miller") Charge		-	12	-	nC
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On DelayTime	V <sub>GS</sub> = 10V, V <sub>DD</sub> =10V I <sub>D</sub> = 30A, R <sub>GEN</sub> = 3 Ω	-	8	-	ns
t <sub>r</sub>	Turn-On Rise Time		-	19	-	ns
t <sub>d(off)</sub>	Turn-Off DelayTime		-	73	-	ns
t <sub>f</sub>	Turn-Off Fall Time		-	80	-	ns
<b>Drain-Source Diode Characteristics and Max Ratings</b>						
I <sub>S</sub>	Maximum Continuous Drain to Source Diode Forward Current		-	-	90	A
I <sub>SM</sub>	Maximum Pulsed Drain to Source Diode Forward Current		-	-	360	A
V <sub>SD</sub>	Drain to Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 30A	-	-	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =20A, di/dt=100A/us	-	16	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	5.6	-	nC

Notes: 1.Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.

2.E<sub>AS</sub> condition: Starting T<sub>J</sub>=25°C, V<sub>DD</sub>=10V, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=25A.

3.R<sub>θJA</sub> is measured with the device mounted on a 1 inch<sup>2</sup> pad of 2oz copper FR4 PCB

4.Pulse Test: Pulse Width ≤300us, Duty Cycle ≤0.5%.



## Typical Performance Characteristics

Figure 1: Output Characteristics

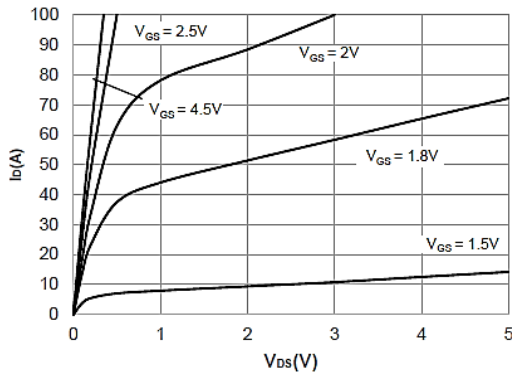


Figure 2: Typical Transfer Characteristics

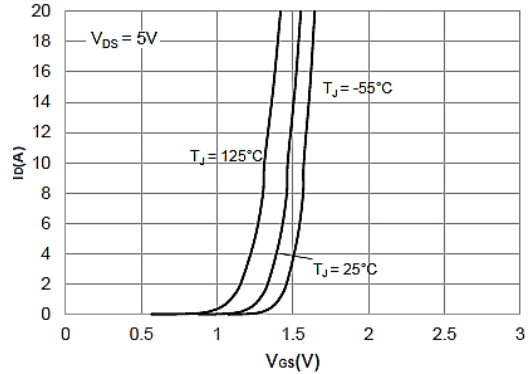


Figure 3: On-resistance vs. Drain Current

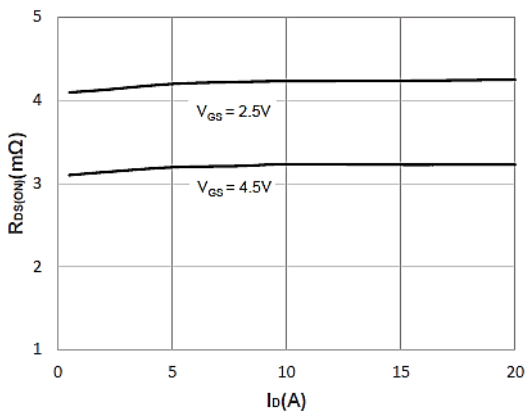


Figure 4: Body Diode Characteristics

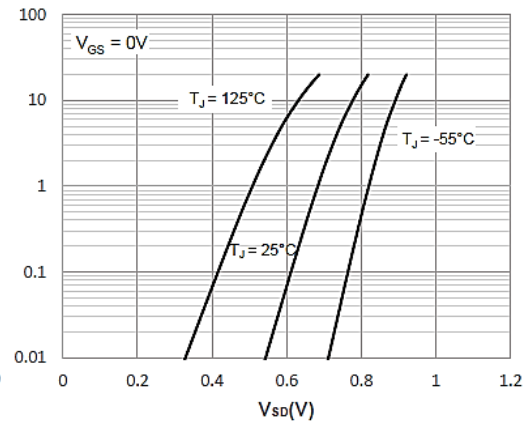


Figure 5: Gate Charge Characteristics

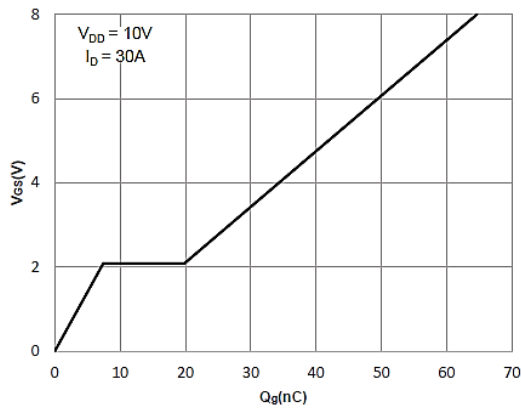


Figure 6: Capacitance Characteristics

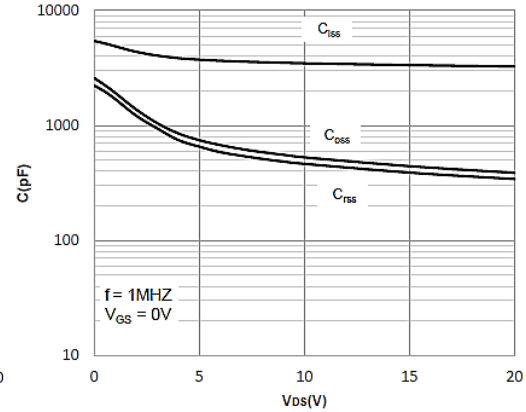




Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

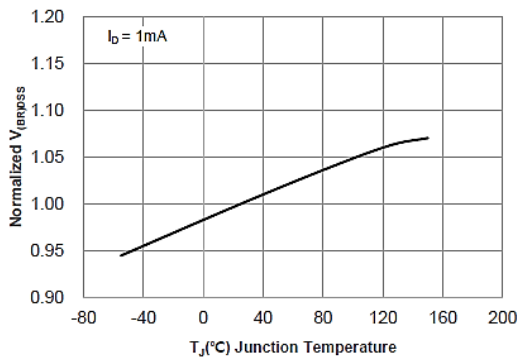


Figure 8: Normalized on Resistance vs. Junction Temperature

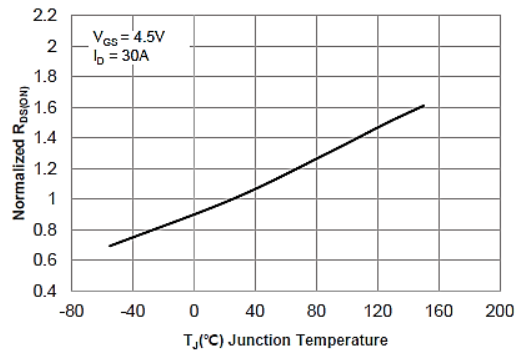


Figure 9: Maximum Safe Operating Area

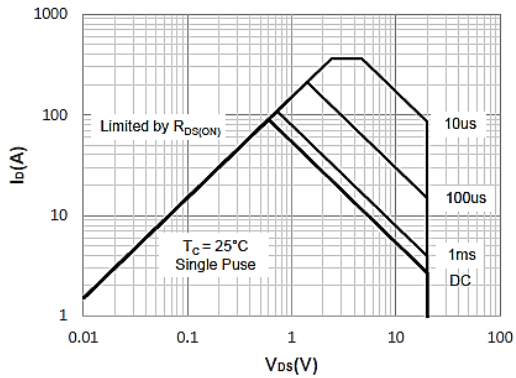


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

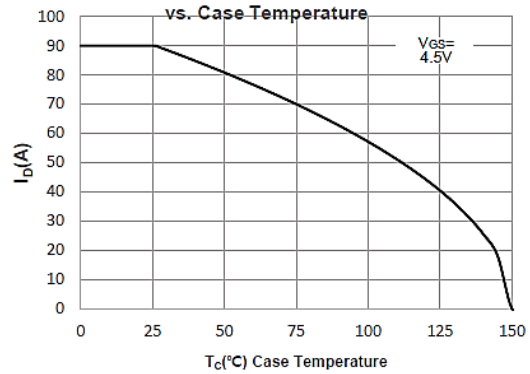


Figure 11: Normalized Maximum Transient Thermal Impedance

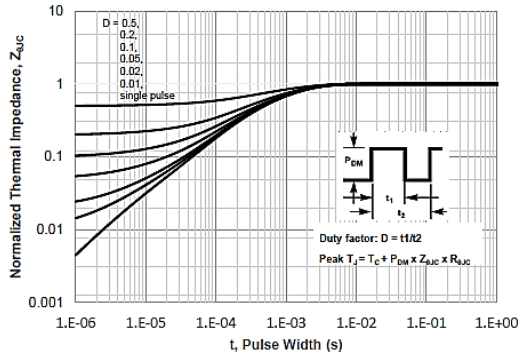
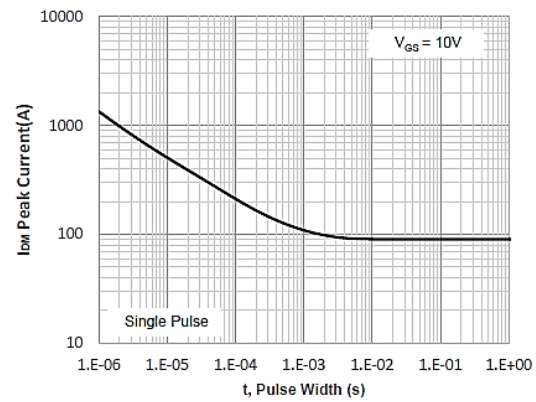


Figure 12: Peak Current Capacity





## Test Circuit

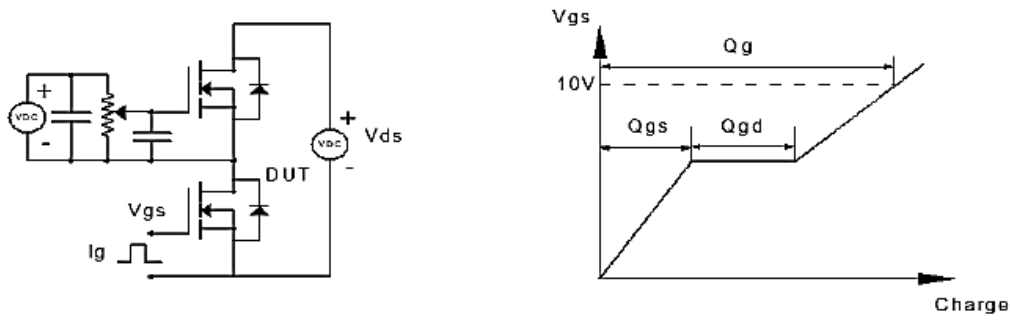


Figure 1: Gate Charge Test Circuit & Waveform

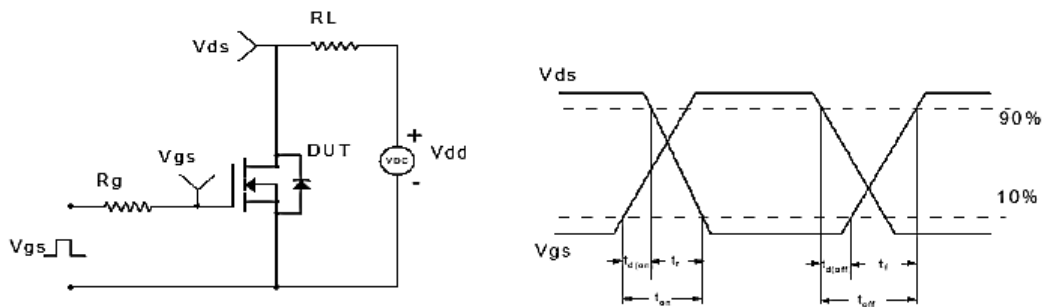


Figure 2: Resistive Switching Test Circuit & Waveform

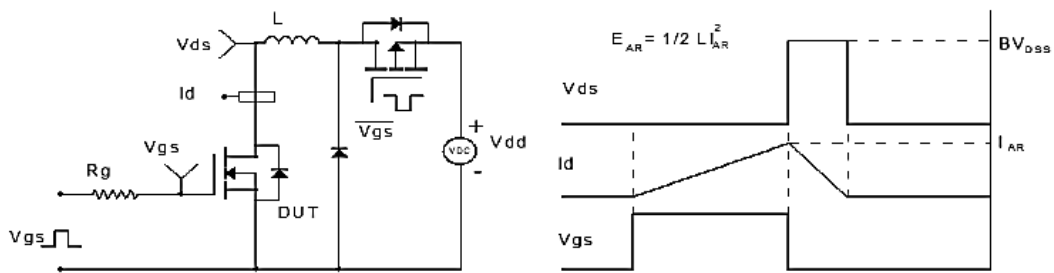


Figure 3: Unclamped Inductive Switching Test Circuit & Waveform

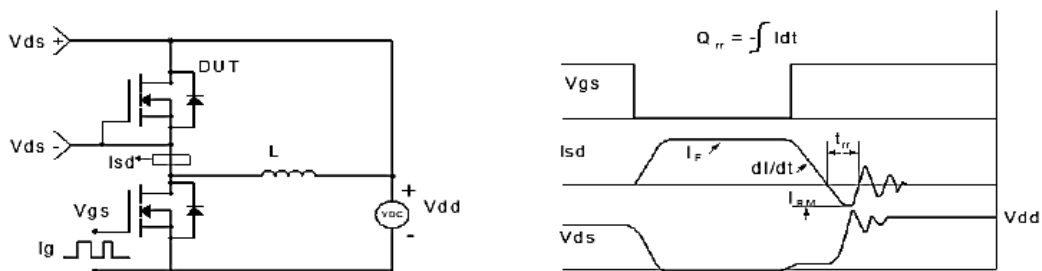
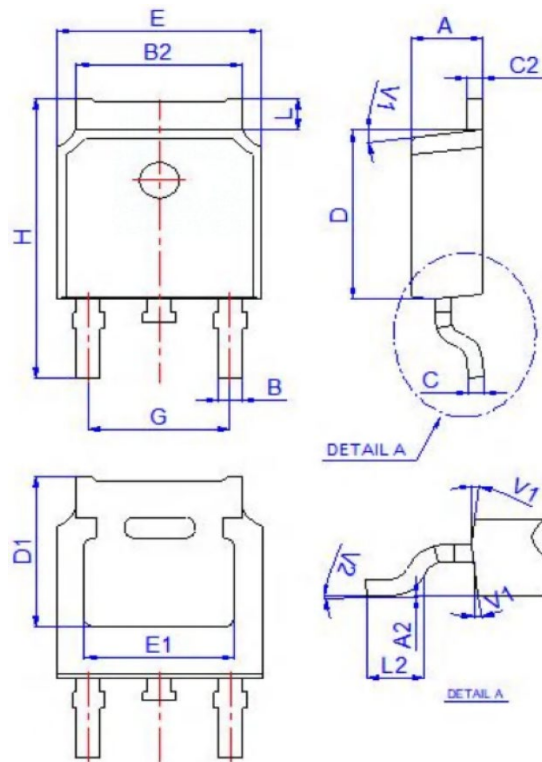


Figure 4: Diode Recovery Test Circuit & Waveform



### Package Mechanical Data(TO-252-3L)



Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A2	0	0.10	0	0.004
B	0.66	0.86	0.026	0.034
B2	5.18	5.48	0.202	0.216
C	0.40	0.60	0.016	0.024
C2	0.44	0.58	0.017	0.023
D	5.90	6.30	0.232	0.248
D1	5.30 REF		0.209 REF	
E	6.40	6.80	0.252	0.268
E1	4.63		0.182	
G	4.47	4.67	0.176	0.184
H	9.50	10.70	0.374	0.421
L	1.09	1.21	0.043	0.048
L2	1.35	1.65	0.053	0.065
V1	7°		7°	
V2	0°	6°	0°	6°

### Ordering information

Order Code	Package	V <sub>DS</sub> (V)	I <sub>D</sub> (A)	R <sub>DS(ON)</sub> (mΩ)	
QND100N02AJ	TO-252	20	90	V <sub>GS</sub> =4.5V	3.1
				V <sub>GS</sub> =2.5V	4.2