Product Specification

QND60P03AJ

30V P-Channel MOSFET

FEATURES

- V_{DS} = -30V, I_D = -60A

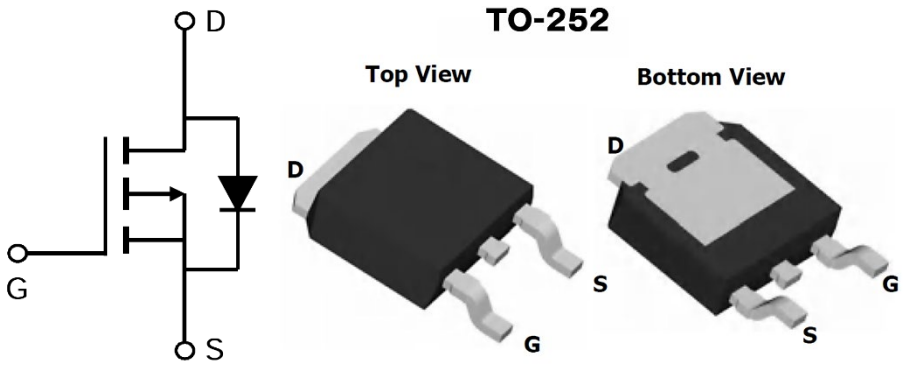
  $R_{DS(ON)}$ = 5.4 mΩ @ V_{GS} = -10V

  $R_{DS(ON)}$ = 7.2 mΩ @ V_{GS} = -4.5V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free product is acquired

Applications

- PWM Applications
- Load Switch
- Power Management

Pin Description



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

Absolute Maximum Ratings

(@ T_C = 25℃ unless otherwise specified)

Symbol	Parameter		Value	Unit
V_{DS}	Drain-to-Source Voltage		-30	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C=25℃	-60	A
		T_C=100℃	-36	
I_{DM}	Pulsed Drain Current (1)		-240	A
E_{AS}	Single Pulsed Avalanche Energy (2)		152	mJ
P_D	Power Dissipation	T_C = 25℃	62	W
		T_C=100℃	38	
T_J, T_{STG}	Junction & Storage Temperature Range		-55 to 150	℃

Thermal Characteristics

Symbol	Parameter	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient(3)	28	℃/W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	2.2	

Electrical Characteristics

(T_J = 25℃ unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D=-50uA,V_{GS}=0V	-30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-30V,V_{GS}=0V	-	-	-1.0	uA
I_{GSS}	Gate-Body Leakage Current	V_{DS}=0V,V_{GS}=±20V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=-250uA	-1.1	-1.5	-2.5	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS}=-10V,I_D=-20A	-	5.4	6.3	mΩ
		V_{GS}=-4.5V, I_D=-10A	-	7.2	9.5	mΩ
Dynamic Characteristics						
R_g	Gate Resistance	f=1MHz	-	10.1	-	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz	-	3836	-	pF
C_{oss}	Output Capacitance		-	563	-	pF
C_{rss}	Reverse Transfer Capacitance		-	433	-	pF
Q_g	Total Gate Charge	V_{GS}=0~-10V, V_{DS}=-15V, I_D=-10A	42	59	80	nC
Q_{gs}	Gate Source Charge		-	9.5	-	nC
Q_{gd}	Gate Drain("Miller") Charge		10	14	19	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DD}=-15V I_D=-10A, R_{GEN}=2.7Ω	-	6.8	-	ns
t_r	Turn-On Rise Time		-	5.7	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	112	-	ns
t_f	Turn-Off Fall Time		-	78	-	ns
Body Diode Characteristics						
I_S	Maximum Continuous Body Diode Forward Current		-	-	-60	A
I_{SM}	Maximum Pulsed Body Diode Forward Current		-	-	-240	A
V_{SD}	Body Diode Forward Voltage	V_{GS}=0V, I_S=-20A	-		-1.2	V
t_{rr}	Body Diode Reverse Recovery Time	I_F=-10A, di/dt=100A/us	15	21	29	ns
Q_{rr}	Body Diode Reverse Recovery Charge		-	9.8	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. EAS condition: Starting T_J=25C, V_{DD}=-15V, V_{GS}=-10V, R_G=25Ω, L=0.5mH, I_{AS}=-23.1A, V_{DD}=0V during time in avalanche.
3. $R_{\theta JA}$ is measured with the device mounted on a 1 $inch^2$ pad of 2oz copper FR4 PCB.
4. Pulse Test: Pulse Width≤300us, Duty Cycle≤0.5%.

Typical Performance Characteristics

Figure 1: Power De-rating

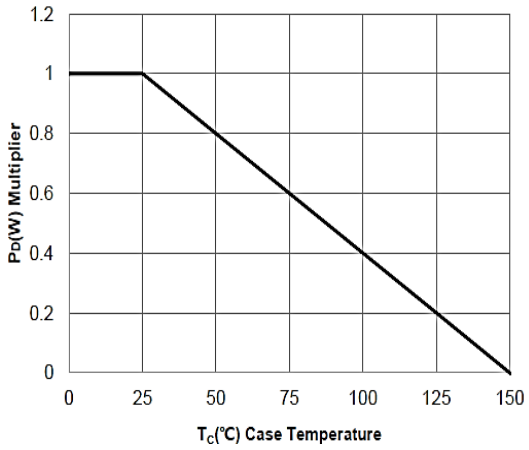


Figure 2: Current De-rating

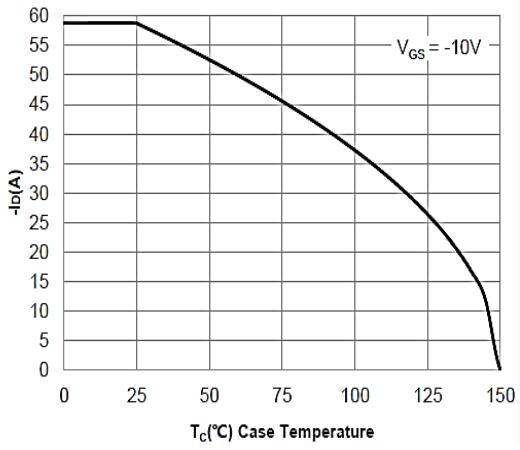


Figure 3: Normalized Maximum Transient Thermal Impedance

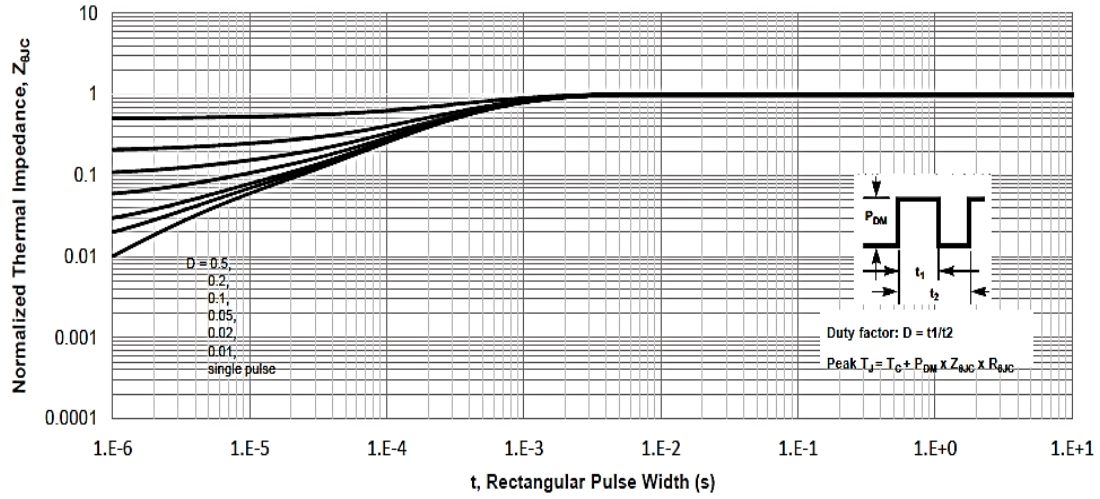


Figure 4: Peak Current Capacity

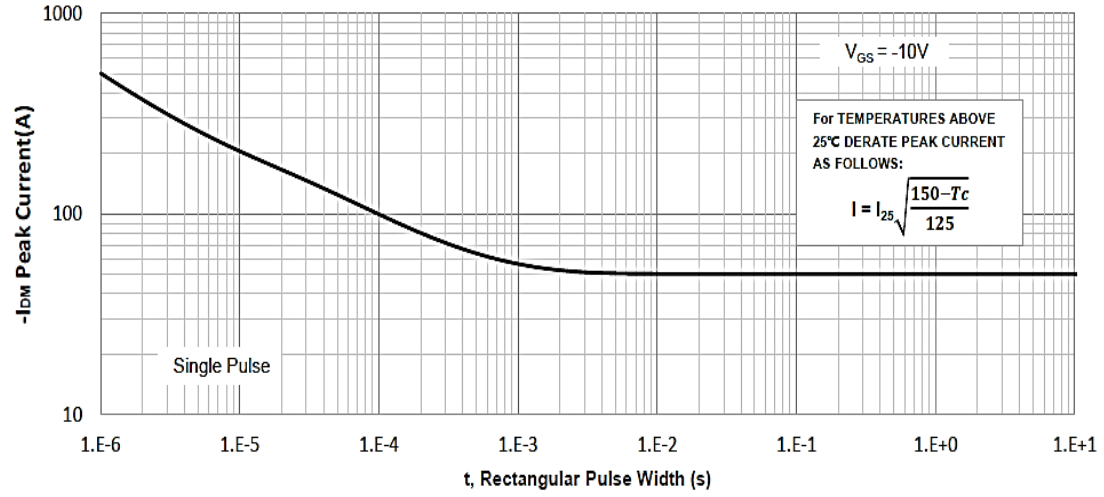


Figure 5: Output Characteristics

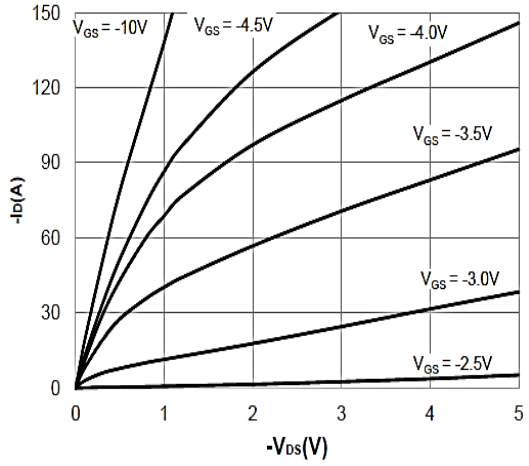


Figure 6: Typical Transfer Characteristics

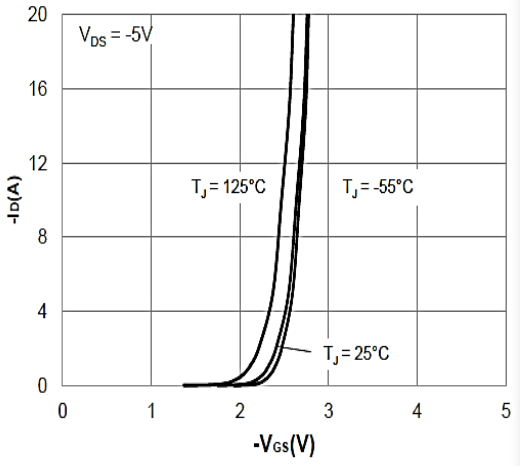


Figure 7: On-resistance vs. Drain Current

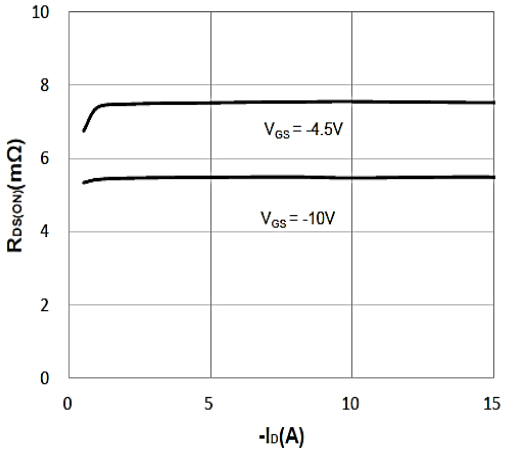


Figure 8: Body Diode Characteristics

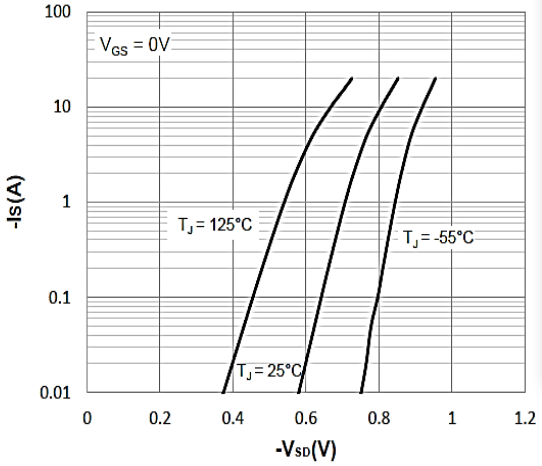


Figure 9: Gate Charge Characteristics

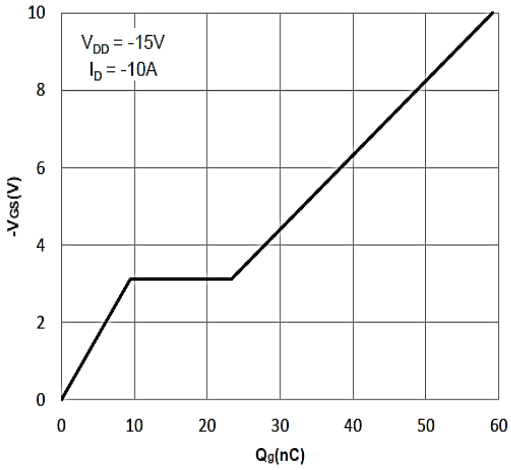


Figure 10: Capacitance Characteristics

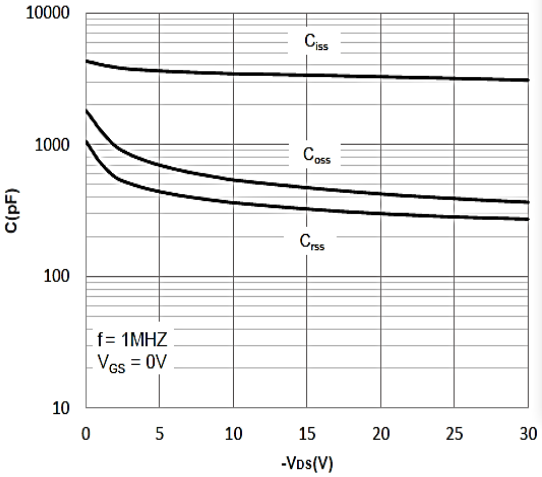


Figure 11: Normalized Breakdown voltage vs. Junction Temperature

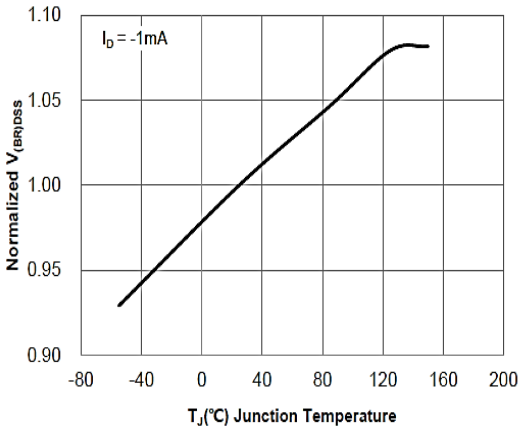


Figure 12: Normalized on Resistance vs. Junction Temperature

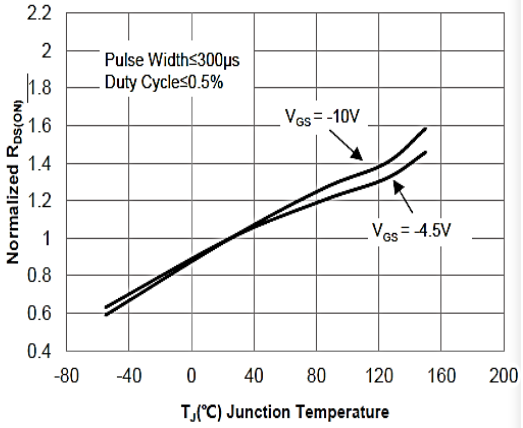


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

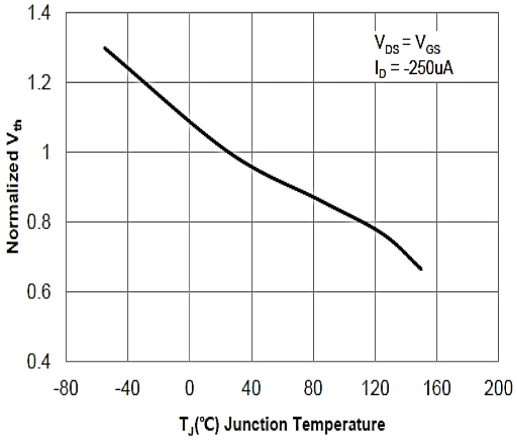


Figure 14: $R_{DS(ON)}$ vs. V_{GS}

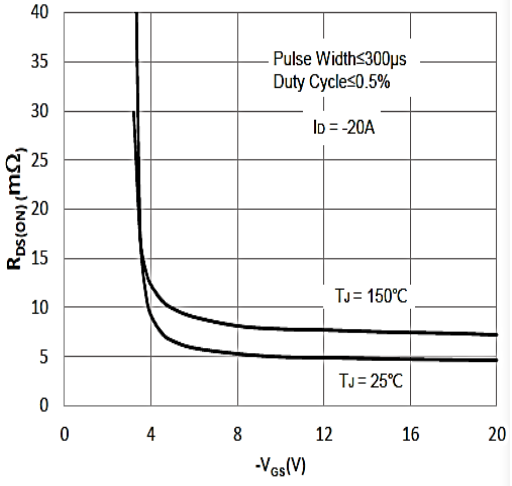
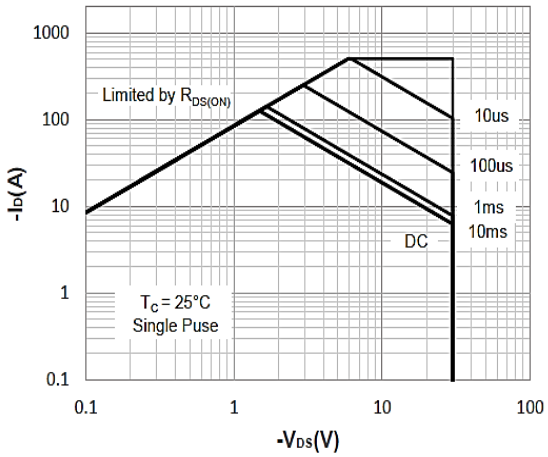


Figure 15: Maximum Safe Operating Area



Test Circuit

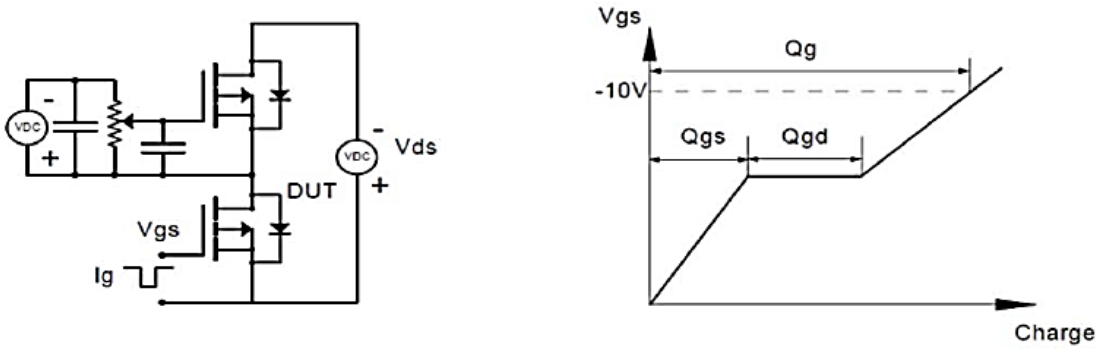


Figure 1: Gate Charge Test Circuit & Waveform

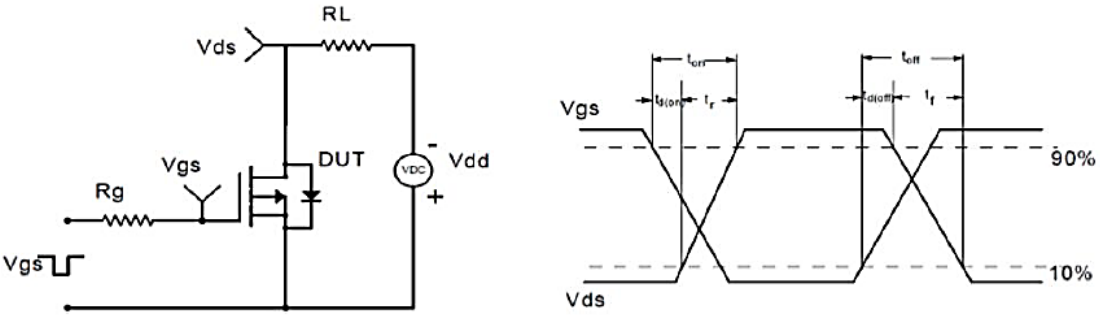


Figure 2: Resistive Switching Test Circuit & Waveform

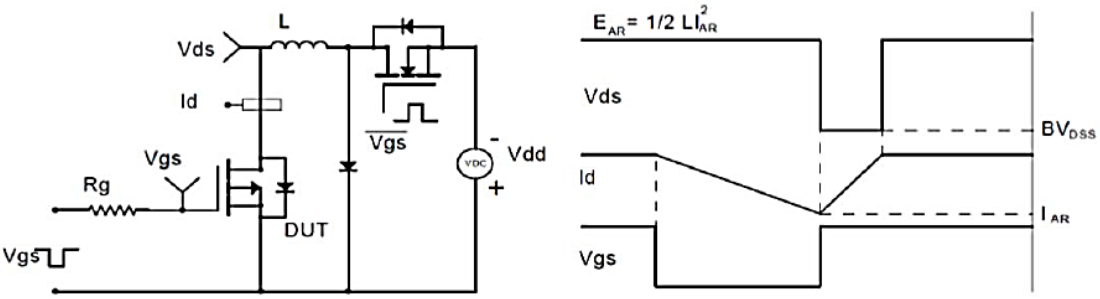


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

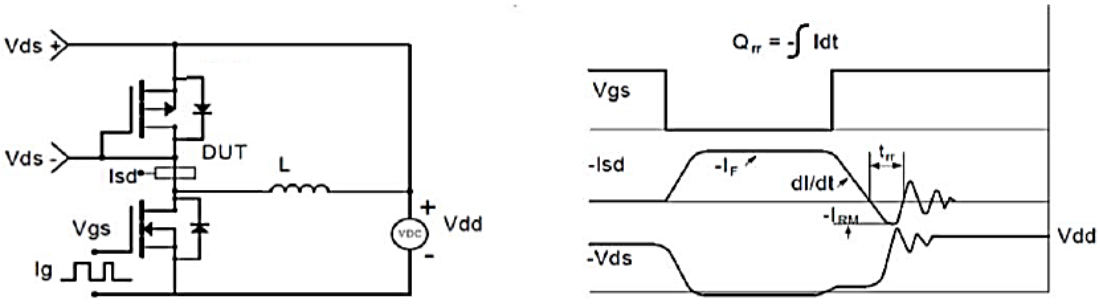
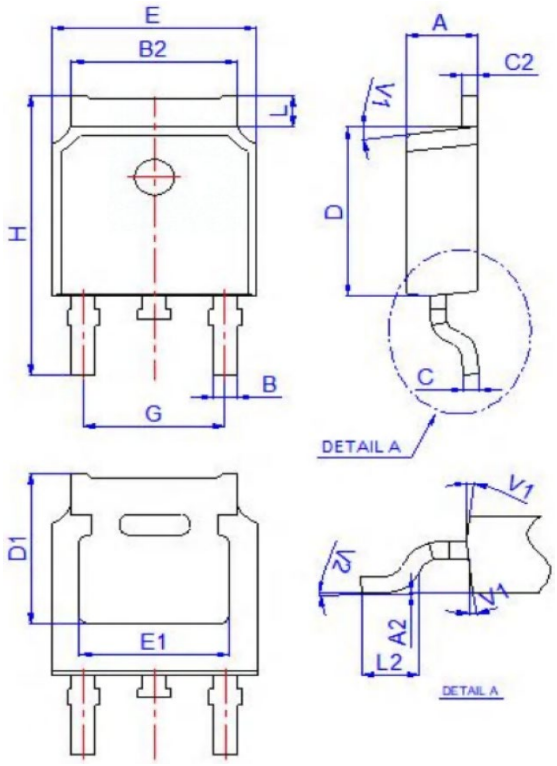


Figure 4: Diode Recovery Test Circuit & Waveform

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_{DS}(V)	I_D(A)	$R_{DS(ON)}$(m Ω)	
QND60P03AJ	TO-252	-30	-60	V_{GS}=-10V	5.4
				V_{GS}=-4.5V	7.2