Description

The ENP2N7002VR has been designed to minimize the on-state resistance (RDS(on)) and yet maintain superior switching performance, making it ideal for high efficiency power management applications.

General Features

- VDS =60V ID =300mA
  RDS(ON)(Typ.) =2Ω @VGS=10V
  RDS(ON)(Typ.) =2.5Ω @VGS=4.5V
- Low On-Resistance
- Low Input Capacitance
- Fast Switching Speed
- Fast Switching Speed
- Lead, Halogen and Antimony Free, RoHS Compliant "Green"
- ESD Protected Up To 2kV

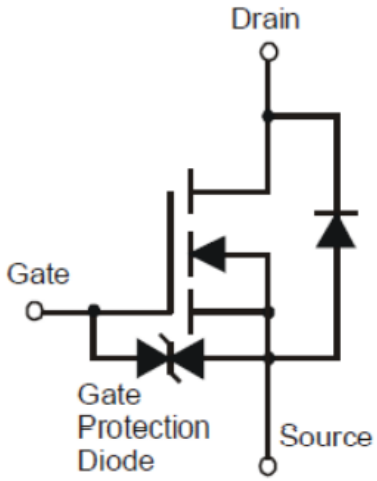
Application

- Motor control
- Power Management Functions
- Backlighting

Package

- SOT-23

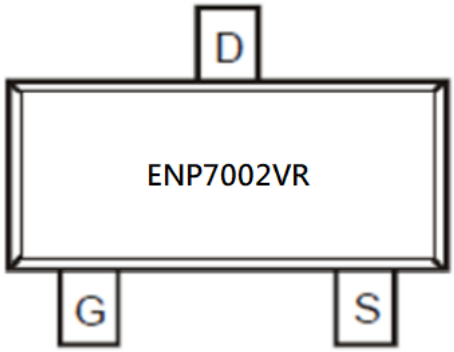
Schematic diagram



Equivalent Circuit

Marking and pin assignment

SOT-23
(TopView)



Ordering Information

ENP2N7002VR XX R

B1=SOT-23

Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

parameter		symbol	limit	unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	±20	V
Continuous Drain Current	TC=25℃	I_D	380	mA
	TC=70℃		300	
Pulsed Drain Current		I_{DP}	1.2	A
Maximum power dissipation	TC=25℃	P_D	540	mW
Operating junction Temperature range		Tj	-55—150	℃

Electrical Characteristics (TA=25℃ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
		T_J=85℃	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±1	uA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	1.45	2.1	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=380mA	-	1.7	2	Ω
		V_{GS}=4.5V, I_D=300mA		2.6	3	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=5V, V_{GS}=10V	380	-	-	mA
Diode Characteristics						
Diode Forward Voltage[1]	V_{SD}	I_{SD}=300mA,V_{GS}=0V	-	0.9	1.1	V
Diode Continuous Forward Current	I_S		-	-	380	mA
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	133	-	mΩ
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=25V f=1.0MHz	-	30	-	pF
Output capacitance	C_{OSS}		-	4.2	-	
Reverse transfer capacitance	C_{RSS}		-	2.9	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DD}=30V, R_L=25Ω, I_D=200mA	-	3.9	-	ns
Turn-on Rise time	tr		-	3.4	-	
Turn-off delay time	$t_{D(OFF)}$		-	15.7	-	
Turn-off Fall time	tf		-	9.9	-	
Total gate charge	Q_g	V_{GS}=10V,I_D=200mA V_{DS}=10V	-	0.3		nC
Gate-source charge	Q_{gs}			0.2		
Gate-drain charge	Q_{gd}		-	0.08	-	

Note: 1: Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

2: Guaranteed by design, not subject to production testing.

Thermal Characteristics

Parameter	Symbol	Typical	Unit
Thermal Resistance-Junction to Case	Rθjc	1.7	℃/W
Thermal Resistance junction-to ambient	Rθja	62.5	

Typical Performance Characteristics

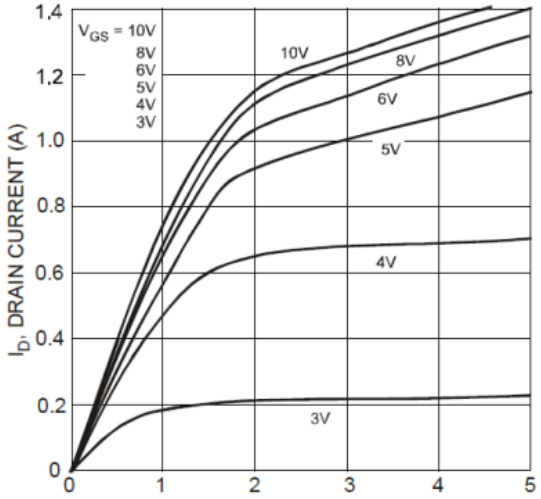


Fig. 1 Typical Output Characteristics

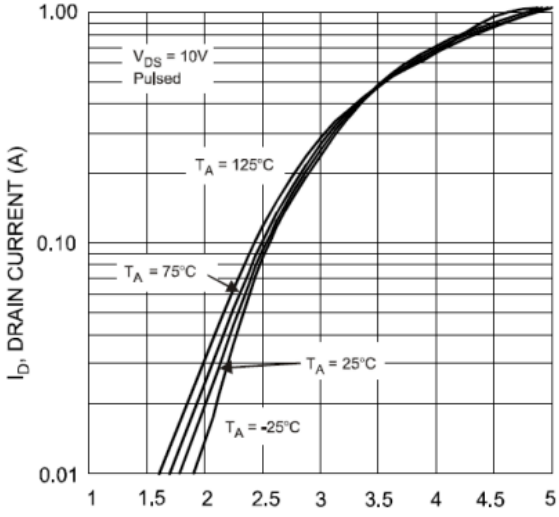


Fig. 2 Typical Transfer Characteristics

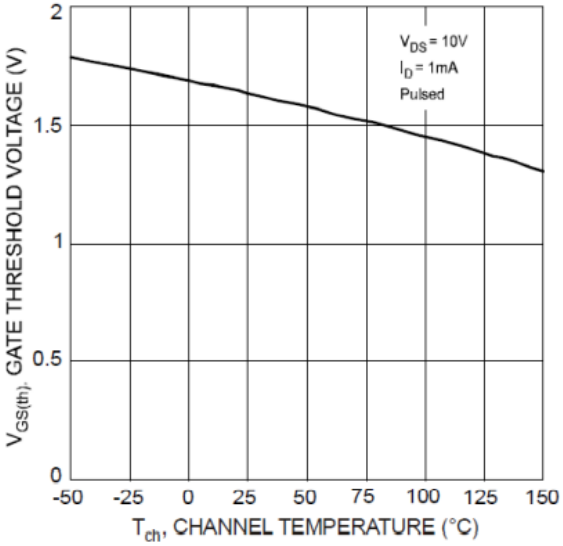


Fig. 3 Gate Threshold Voltage vs. Channel Temperature

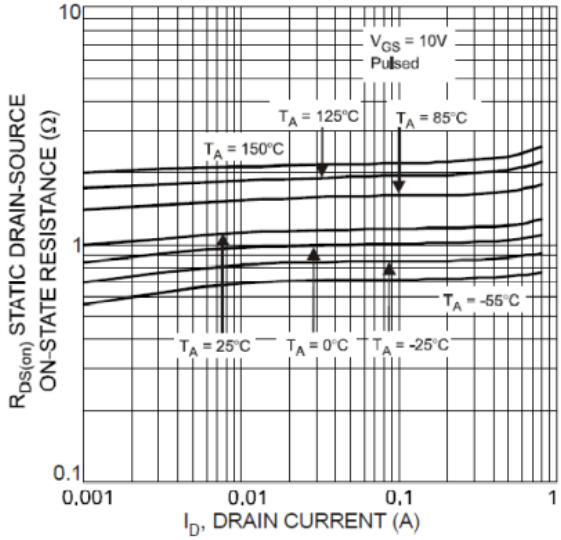


Fig. 4 Static Drain-Source On-Resistance vs. Drain Current

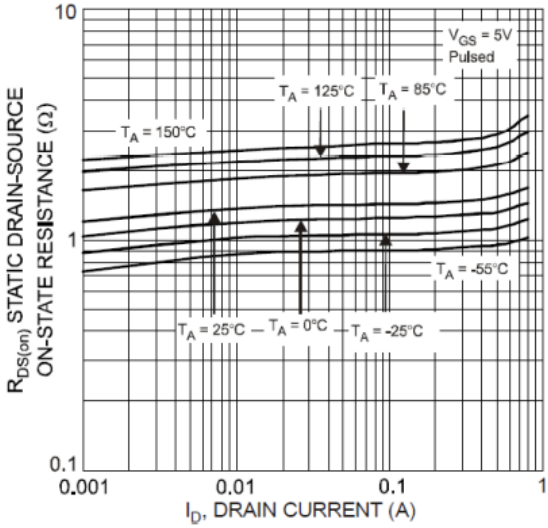


Fig. 5 Static Drain-Source On-Resistance vs. Drain Current

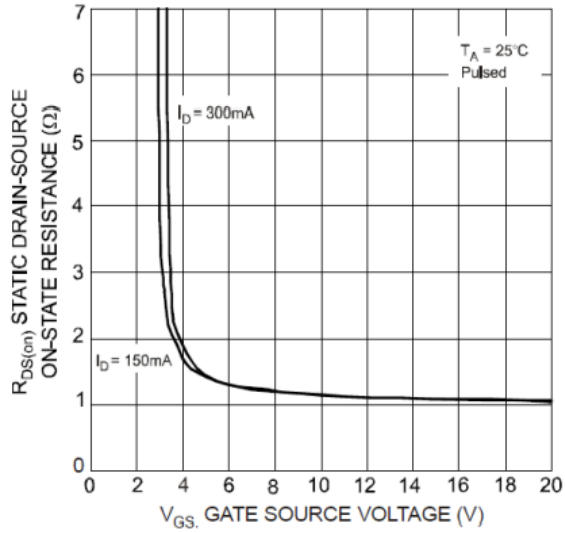


Fig. 6 Static Drain-Source On-Resistance vs. Gate-Source Voltage

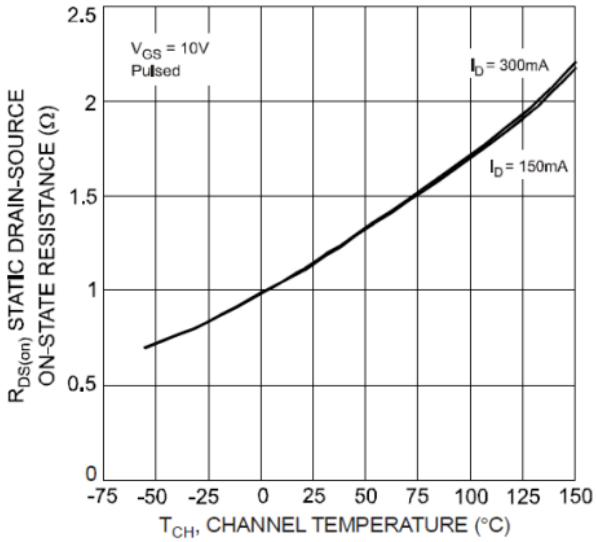


Fig. 7 Static Drain-Source On-State Resistance vs. Channel Temperature

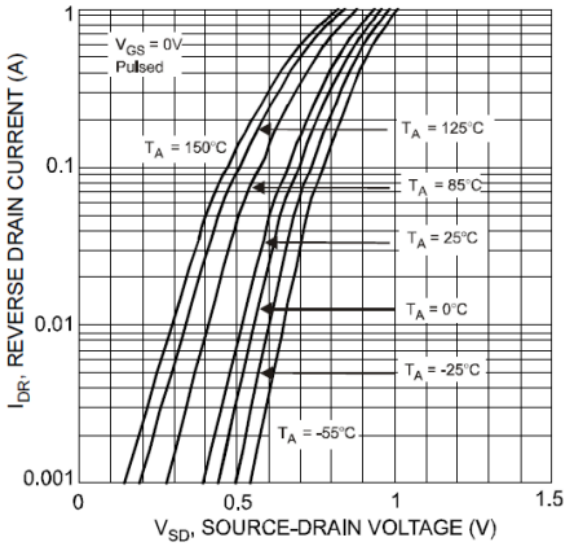


Fig. 8 Reverse Drain Current vs. Source-Drain Voltage

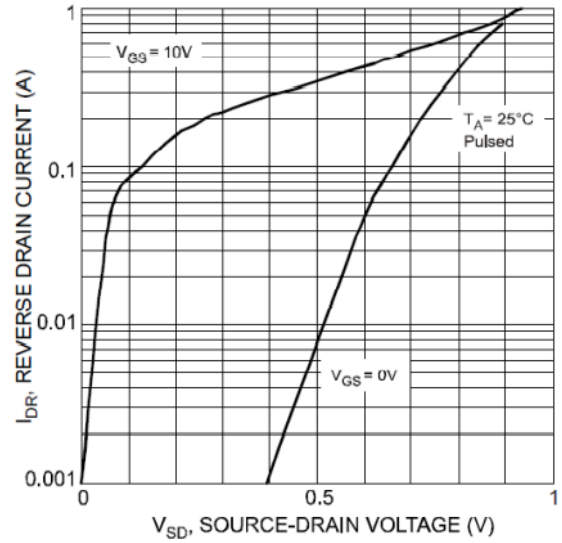


Fig. 9 Reverse Drain Current vs. Source-Drain Voltage

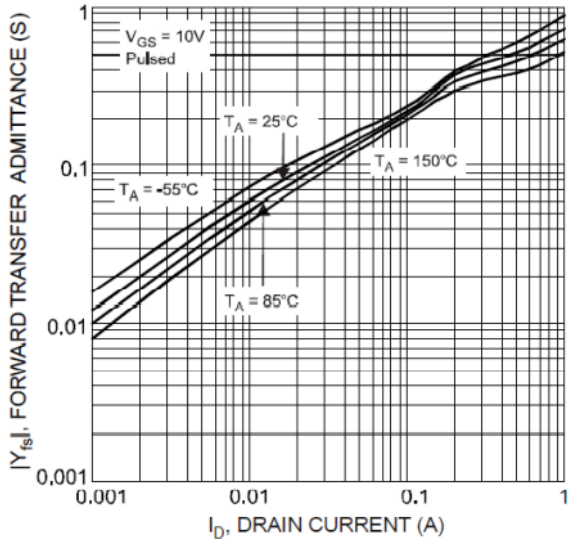


Fig.10 Forward Transfer Admittance vs. Drain Current

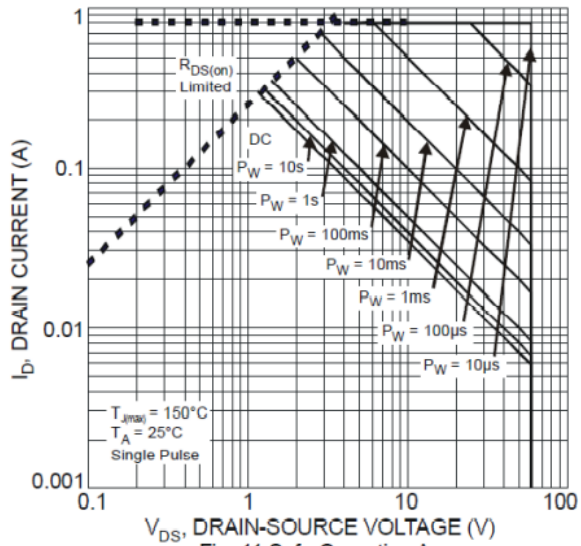


Fig. 11 Safe Operation Area

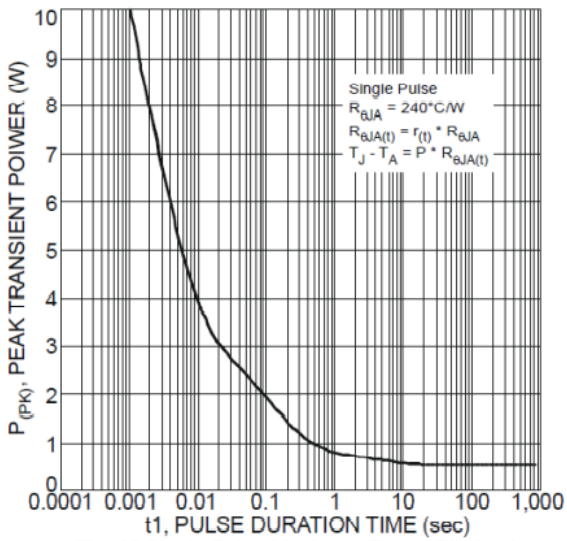


Fig. 12 Single Pulse Maximum Power Dissipation

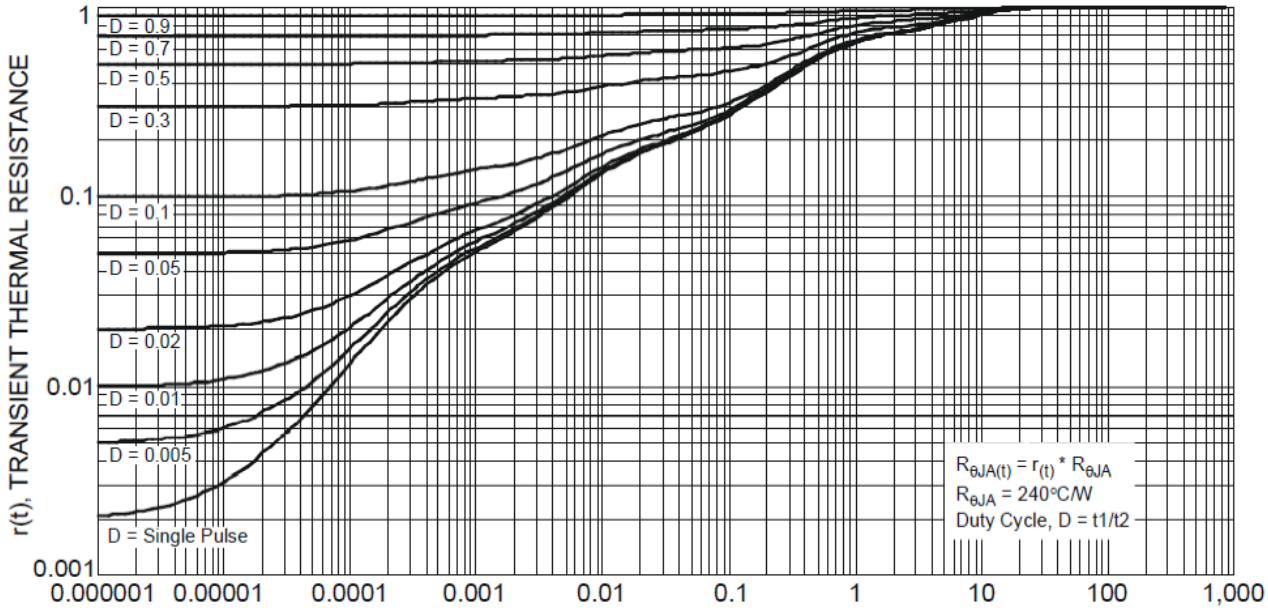
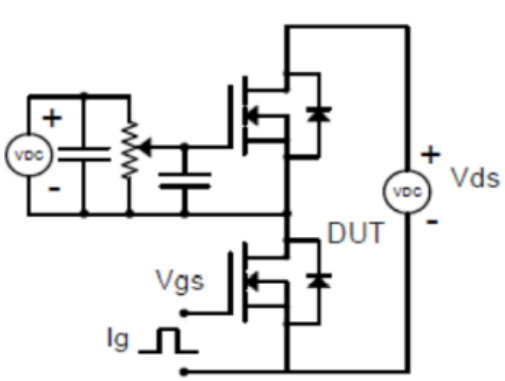
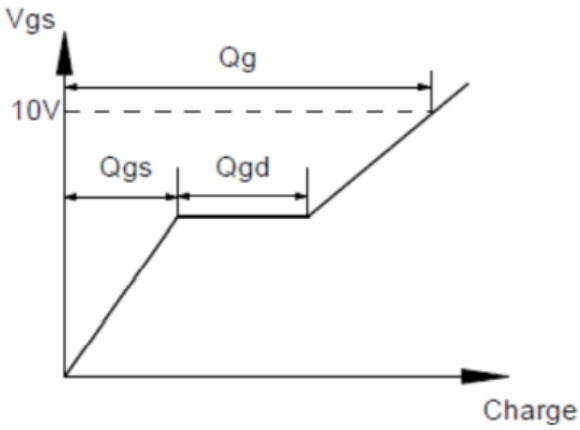


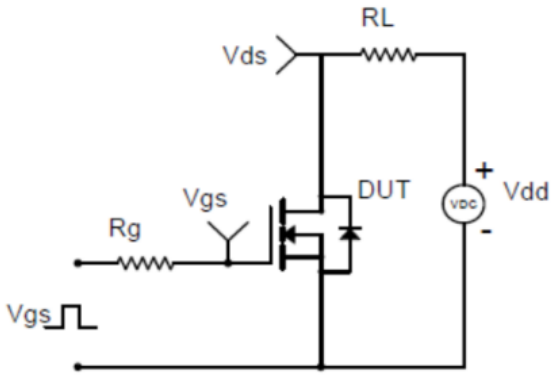
Fig. 13 Transient Thermal Resistance

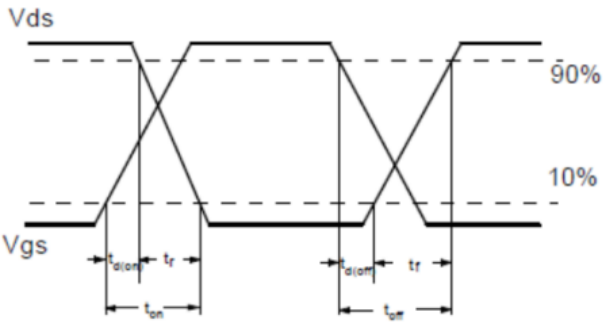
Gate Charge Test Circuit & Waveform



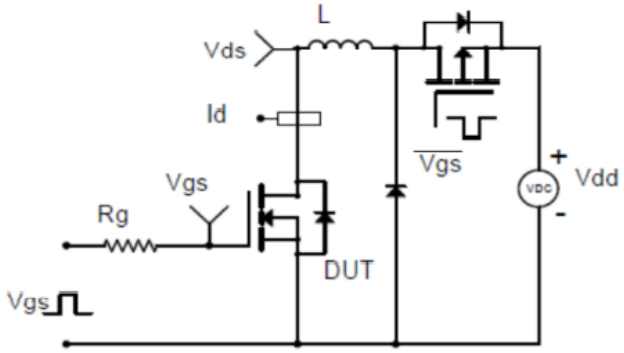


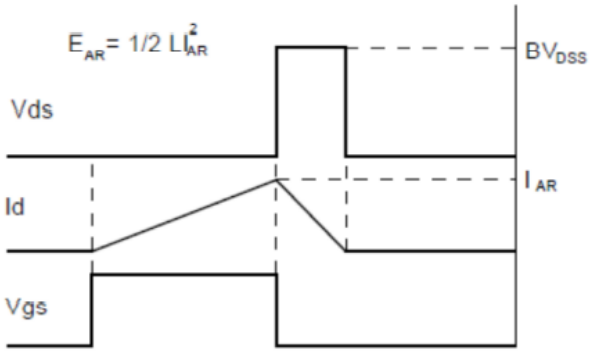
Resistive Switching Test Circuit & Waveforms



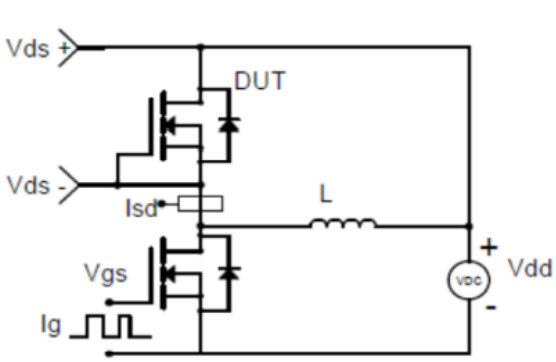


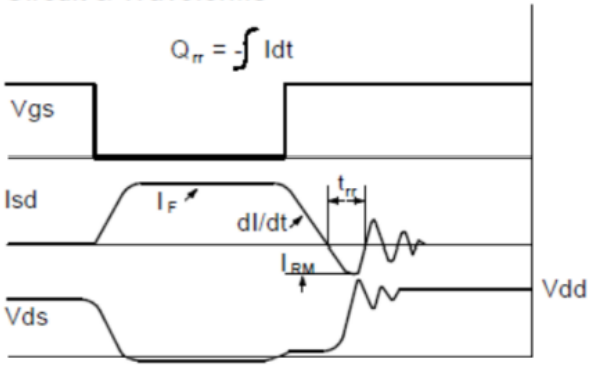
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





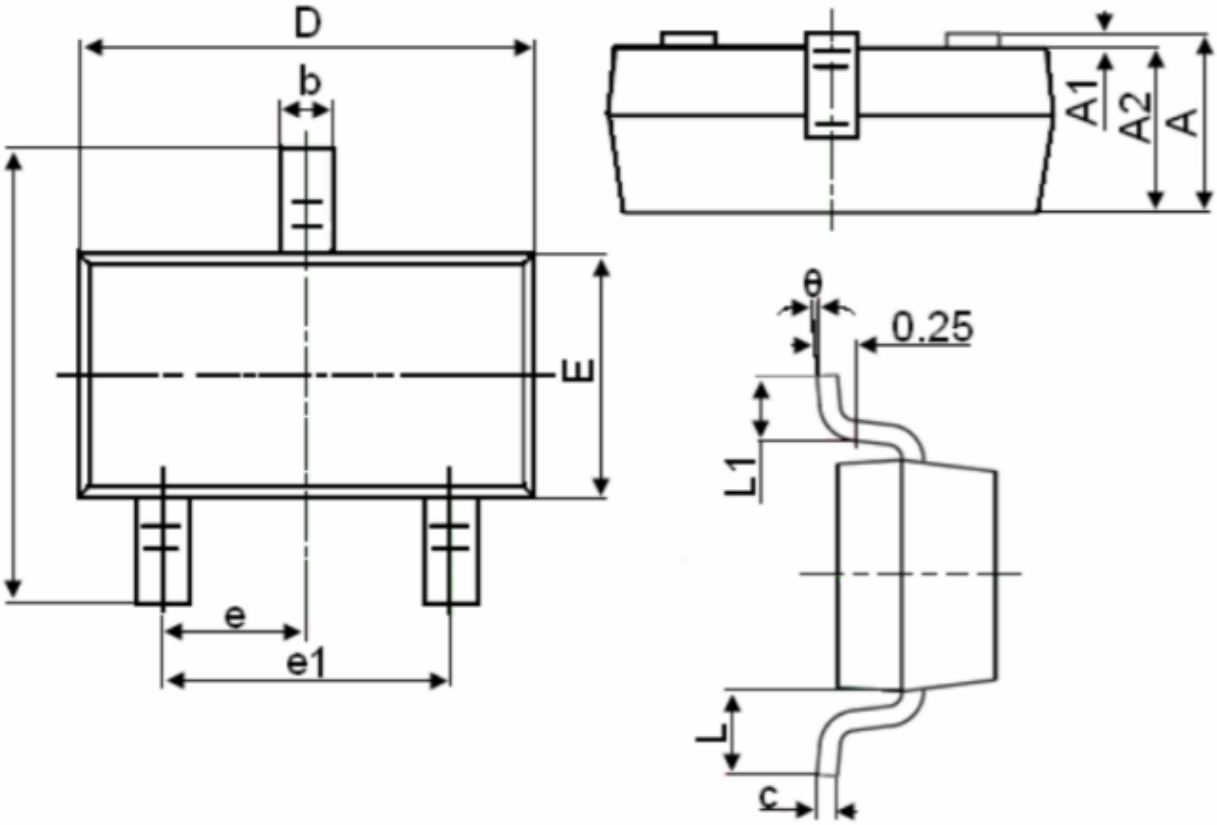
Diode Recovery Test Circuit & Waveforms





Package Information

- SOT-23



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°