60V N-Channel Enhancement Mode MOSFET

Description

The NP6008N uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- V_{DS} =60V I_D =10A
  $R_{DS(ON)}$<25mΩ @V_{GS}=10V (Typ:21m Ω)
  $R_{DS(ON)}$<28mΩ @V_{GS}=4.5V (Typ:25m Ω)
- High density cell design for ultra low Rdson.
- Fully characterized avalanche voltage and current.
- Low gate to drain charge to reduce switching losses.

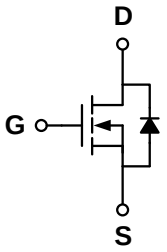
Application

- Power switching application.
- Hard switched and high frequency circuits.
- Uninterruptible power supply.

Package

- SOT-223

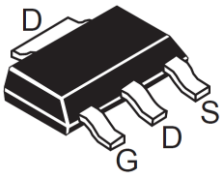
Schematic diagram



Marking and pin assignment

SOT-223

（Top View）



NP: Natlinear Power
6008: 60V8A
N: SOT-223

XXXX: Wafer Lot No.
YYYY: Quality Code

Ordering Information

Part Number	Storage Temperature	Package	Devices Per Reel
NP6008N-G	-55°C to +150°C	SOT-223	3000

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°C	I_D	8	A
	TC=70°C		6	
Pulsed Drain Current		I_{DP}	32	A
Avalanche Current		IAS	15	A
Avalanche energy(L=0.1mH)		EAS	11	mJ
Maximum power dissipation	TC=25°C	P_D	3	W
Power Dissipation – Derate above 25℃	TC=75°C		2	
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
BVDSS Temperature Coefficient	$\triangle BV_{DSS}/\triangle T_J$	Reference to 25℃,ID=1mA		33		mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
Gate Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.2	1.9	2.5	V
Drain-source on-state resistance[1]	$R_{DS(ON)}$	V_{GS}=10V, I_D=8A	-	21	25	mΩ
		V_{GS}=4.5V, I_D=7A		25	28	
On Status Drain Current	$I_{D(ON)}$	V_{DS}=10V, V_{GS}=10V	10	-	-	A
Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_{SD}=1A,V_{GS}=0V	-	0.8	1.1	V
Diode Continuous Forward Current	I_S		-	-	10	A
Reverse Recovery Time	t_{rr}	I_F=10A, dI/dt=100A/us	-	35	-	ns
Reverse Recovery Charge	Q_{rr}		-	43	-	nC
Dynamic Characteristics[2]						
Gate Resistance	R_G	V_{GS}=0V, V_{DS}=0V,f=1MHz	-	3	-	Ω
Input capacitance	C_{ISS}	V_{GS}=0V ,V_{DS}=25V f=1.0MHz	-	720	-	pF
Output capacitance	C_{OSS}		-	150	-	
Reverse transfer capacitance	C_{RSS}		-	90	-	
Turn-on delay time	$t_{D(ON)}$	V_{GS}=10V, V_{DD}=30V, R_L=4.7Ω, I_D=7A, R_G=3.3Ω	-	8	-	ns
Turn-on Rise time	tr		-	5	-	
Turn-off delay time	$t_{D(OFF)}$		-	29	-	
Turn-off Fall time	tf		-	6	-	
Total gate charge	Q_g	V_{GS}=10V,I_D=8A V_{DS}=30V	-	16		nC
Gate-source charge	Q_{gs}			2.7		
Gate-drain charge	Q_{gd}		-	4.4	-	

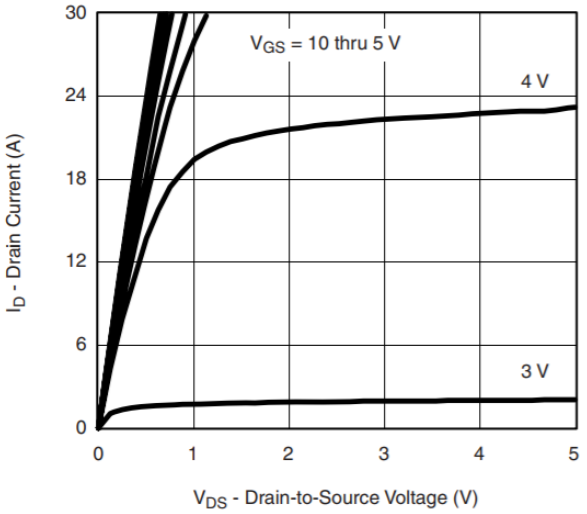
Note: 1：Pulse test; pulse width ≦ 300ns, duty cycle ≦ 2%.

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

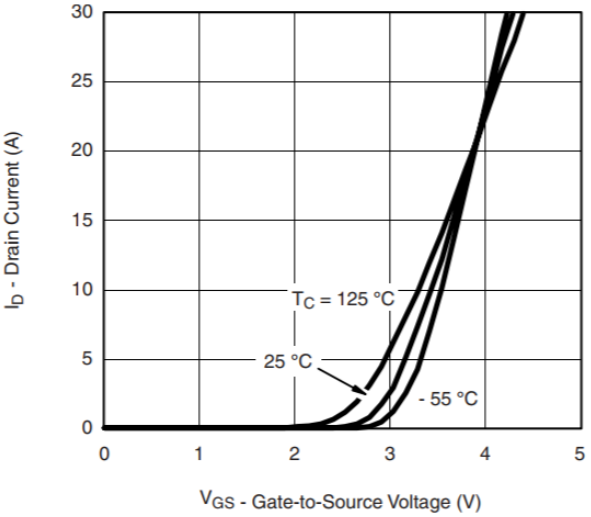
Thermal Characteristics

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

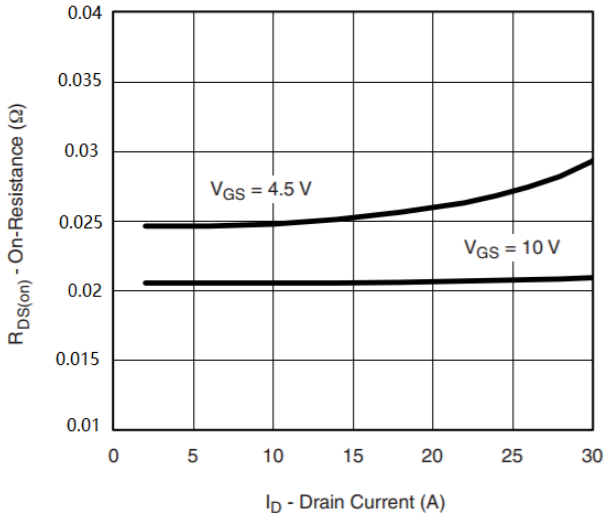
Typical Performance Characteristics



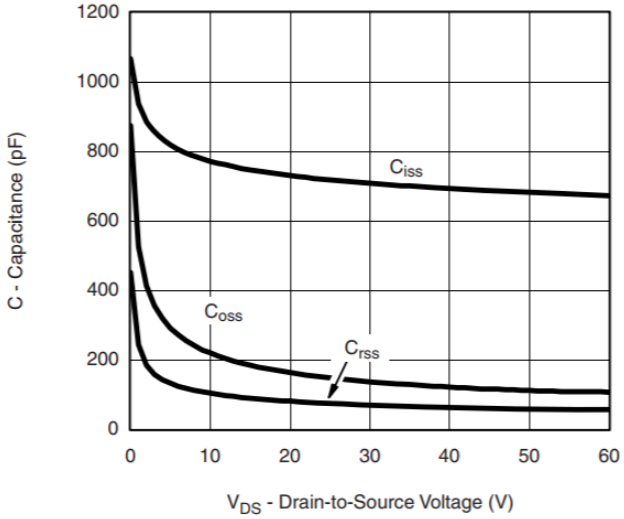
Output Characteristics



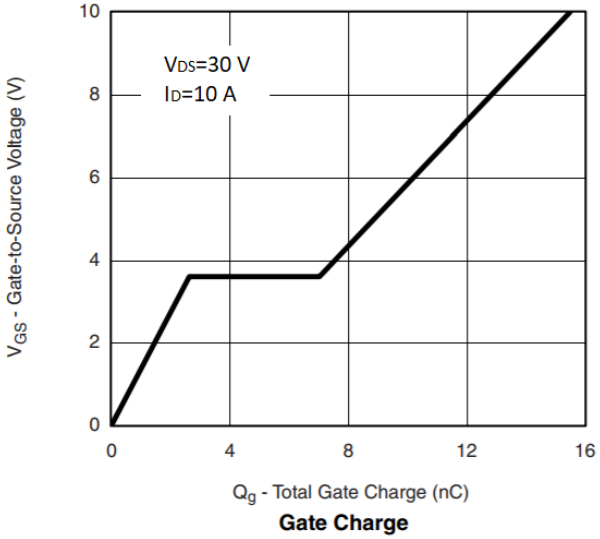
Transfer Characteristics



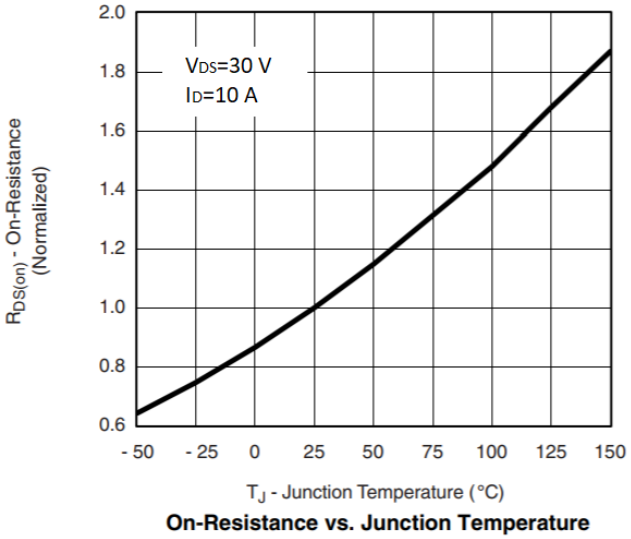
On-Resistance vs. Drain Current



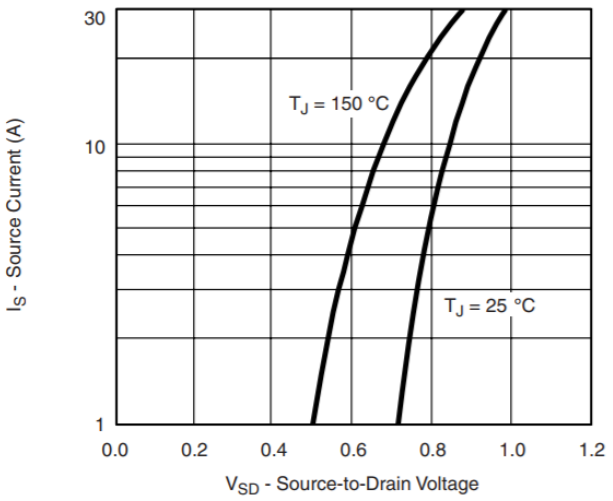
Capacitance



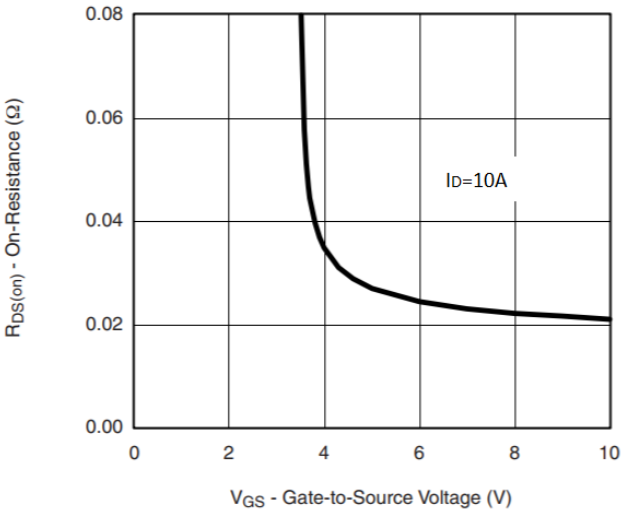
Gate Charge



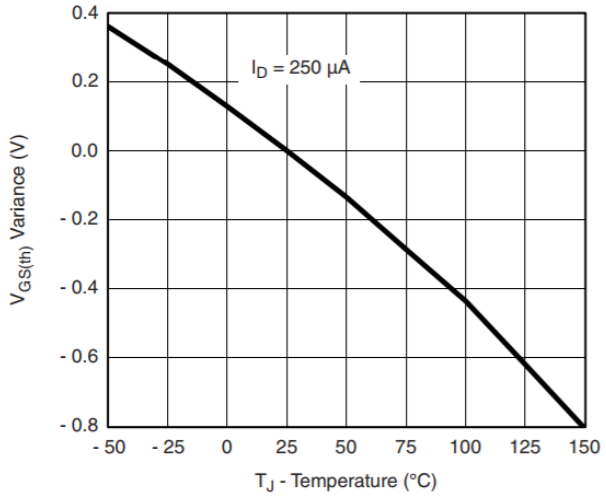
On-Resistance vs. Junction Temperature



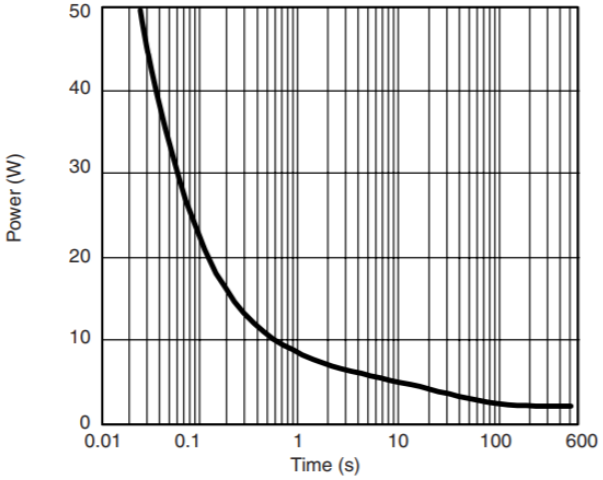
Source-Drain Diode Forward Voltage



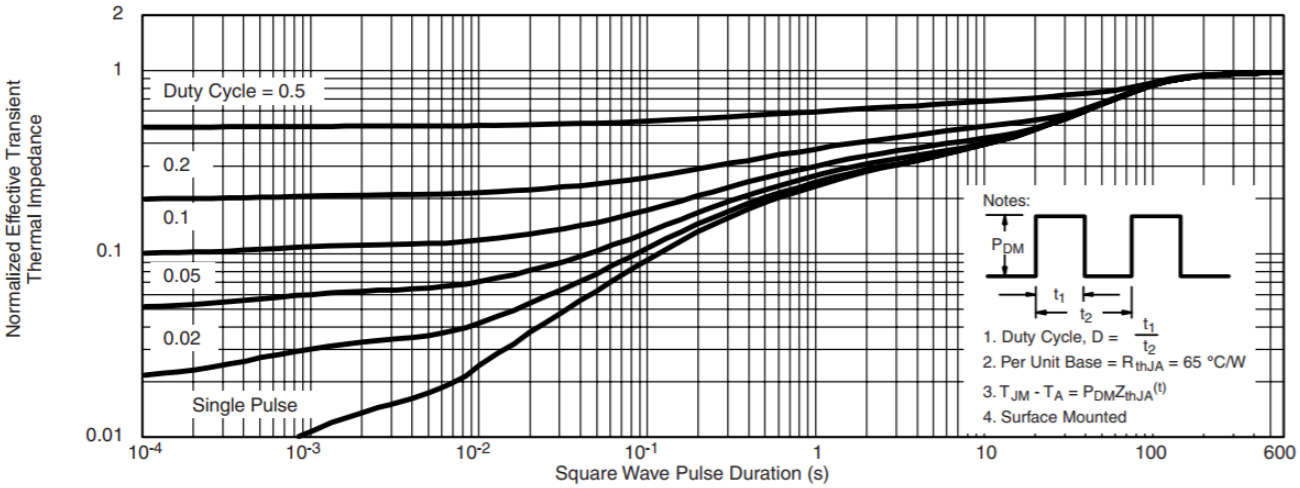
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage

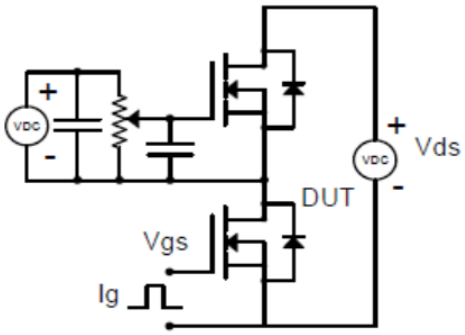


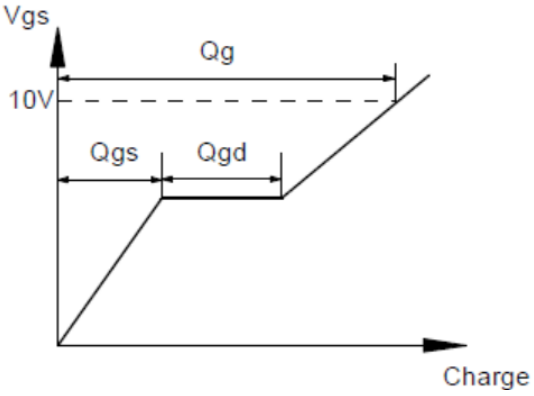
Single Pulse Power, Junction-to-Ambient



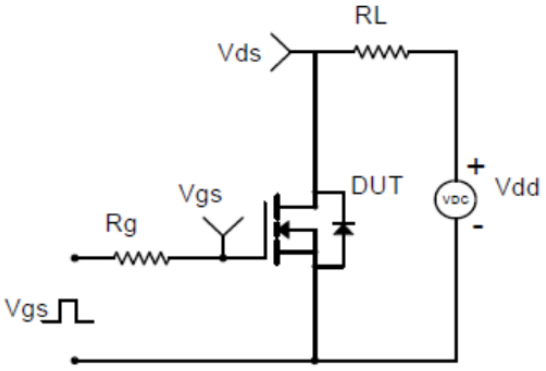
Normalized Thermal Transient Impedance, Junction-to-Ambient

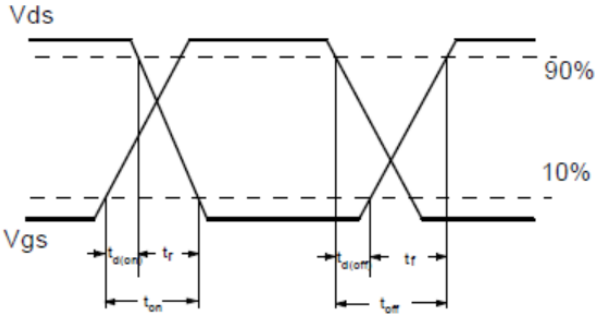
Gate Charge Test Circuit & Waveform



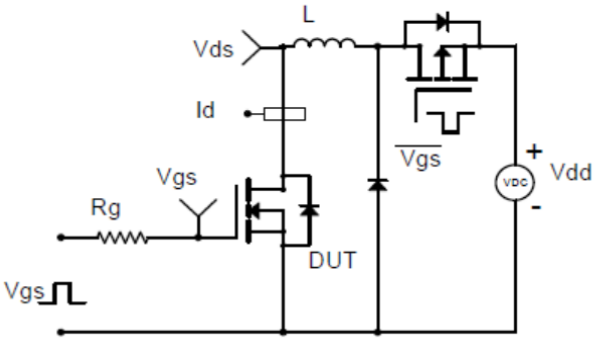


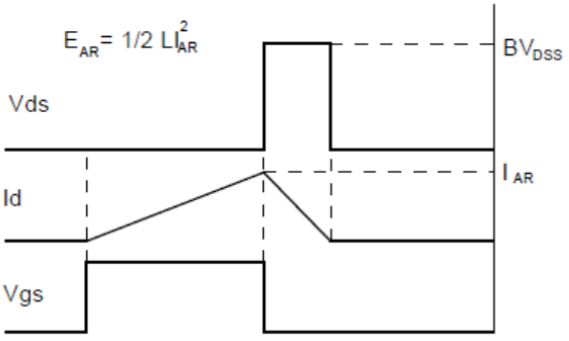
Resistive Switching Test Circuit & Waveforms



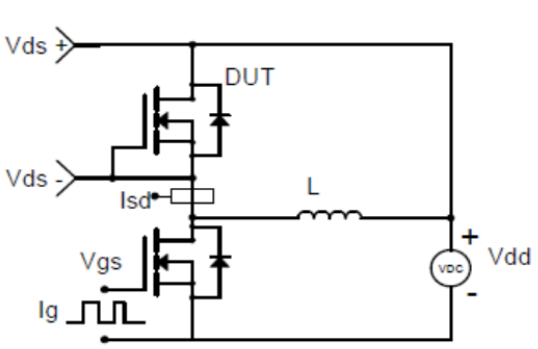


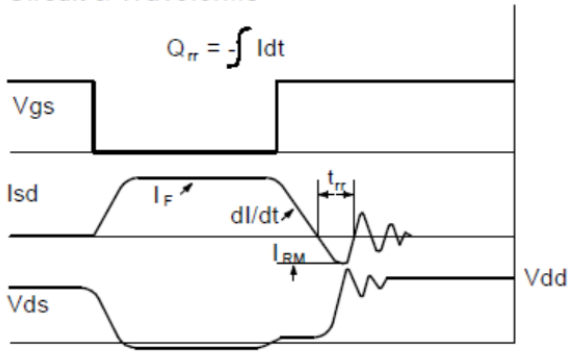
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





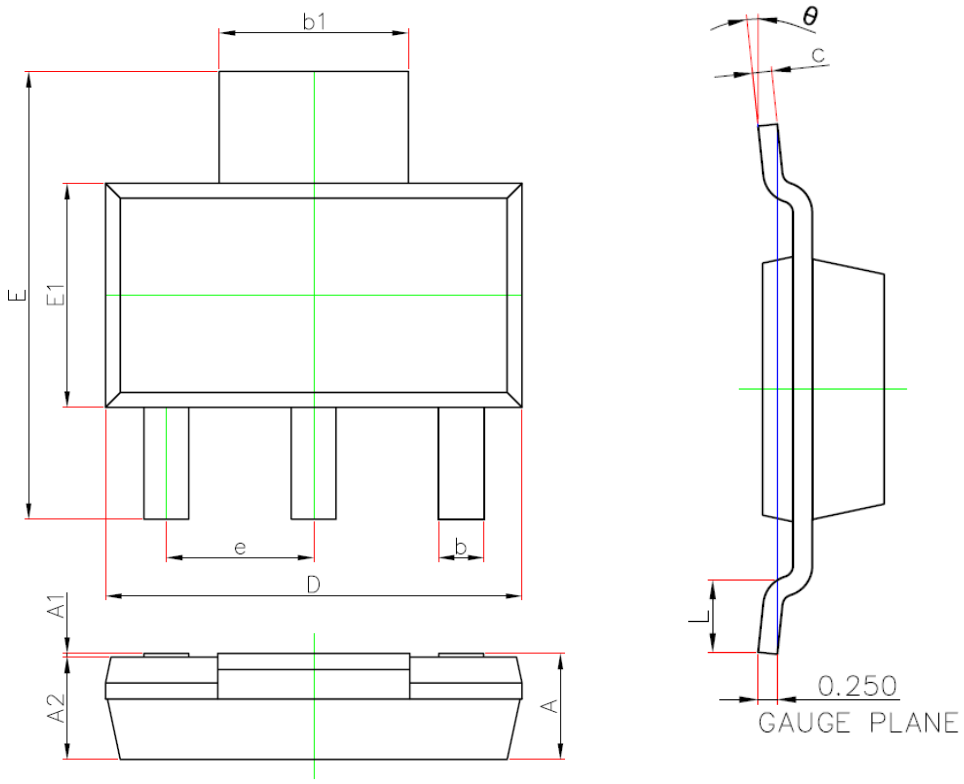
Diode Recovery Test Circuit & Waveforms





Package Information

- **SOT-223**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	——	1.800	——	0.071
A1	0.020	0.100	0.001	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.840	0.026	0.033
b1	2.900	3.100	0.114	0.122
c	0.230	0.350	0.009	0.014
D	6.300	6.700	0.248	0.264
E	6.700	7.300	0.264	0.287
E1	3.300	3.700	0.130	0.146
e	2.300(BSC)		0.091(BSC)	
L	0.750	——	0.030	——
θ	0°	10°	0°	10°