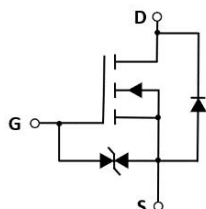
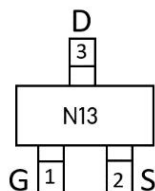


1. General Description

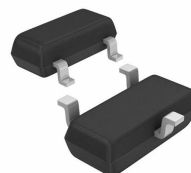
The MN20E013 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 0.7V. This device is suitable for use as a load switch or in Power switch applications. The mosfet with ESD protected as 2000V.



Schematic Diagram



Pin assignment



SOT-523

2. Specification Features

- $V_{DS}=20V, I_D=1.0\text{ A}$
- $R_{DS(ON)} < 250m\Omega @ V_{GS}=4.5\text{ V}$ (TYPE: 210m Ω)
- $R_{DS(ON)} < 350m\Omega @ V_{GS}=2.5\text{ V}$ (TYPE: 290m Ω)
- $R_{DS(ON)} < 800m\Omega @ V_{GS}=1.8\text{ V}$ (TYPE: 520m Ω)
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

3. Application

- PWM applications
- Load switch
- Power management

4. Absolute Maximum Ratings ($T_J=25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	20	V
Gate-Source Voltage		V_{GSS}	± 8	V
Continuous Drain Current (1)	$T_c=25^\circ\text{C}$ (silicon limited)	I_D	1.0	A
	$T_c=25^\circ\text{C}$ (package limited)		0.95	
	$T_c=100^\circ\text{C}$ (silicon limited)		0.72	
Pulsed Drain Current (2)		I_{DM}	6	
Power Dissipation	$T_c=25^\circ\text{C}$	P_D	430	mW
	$T_c=100^\circ\text{C}$		280	
Single Pulse Avalanche Energy (3)		EAS		mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150	$^\circ\text{C}$

5. Thermal Characteristics

Characteristics	Symbol	Rating	Unit
Thermal Resistance,Junction-to-Ambient ⁽¹⁾	R θ JA	446	°C/W
Thermal Resistance,JunctiontoCase	R θ JC	290	

6. Electrical Characteristics (T_J =25°C)

Symbol	Characteristics	Test Conditions	Min	Typ	Max	Unit
Static Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =250μA, V _{GS} =0V	20	22		V
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.35	0.7	1	V
I _{DSS}	Drain CutOff Current	V _{DS} =20V, V _{GS} =0V			1	μA
I _{GSS}	Gate Leakage Current	V _{GS} =±8V, V _{DS} =0V			±1	μA
R _{DS(on)}	Drain-Source On-Resistance	V _{GS} =4.5V, I _D =0.6A		210	250	mΩ
		V _{GS} =2.5V, I _D =0.5A		290	350	
		V _{GS} =1.8V, I _D =0.4A		520	800	
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =1.5A		1		S
Dynamic Characteristics						
Q _g	Total Gate Charge	V _{DS} =4.5V, I _D =0.5A, V _{GS} =10V		1.4		nc
Q _{gs}	Gate Source Charge			0.18		
Q _{gd}	Gate Drain Charge			0.28		
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz		95		pF
C _{rss}	Reverse Transfer Capacitance			12		
C _{oss}	Output Capacitance			21		
t _{D(on)}	Turn-On Delay Time	V _{GS} =4.5V, V _{DS} =10V, R _L =5Ω, R _G =6Ω		24		ns
t _r	Rise Time			86		
t _{D(off)}	Turn-Off Delay Time			750		
t _f	Fall Time			420		
R _g	Gate Resistance	f=1MHz		-		Ω
Drain-Source Body Diode Characteristics						
V _{SD}	SourceDrain Diode Forward Voltage	I _S =0.5A, V _{GS} =0V		0.8	1.2	V
t _{rr}	Body Diode Reverse Recovery Time	I _F =0.5A,		-		ns
Q _{rr}	Body Diode Reverse Recovery Charge	di/dt=100A/μS		-		nc

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

7. Typical Electrical and Thermal Characteristics (Curves)

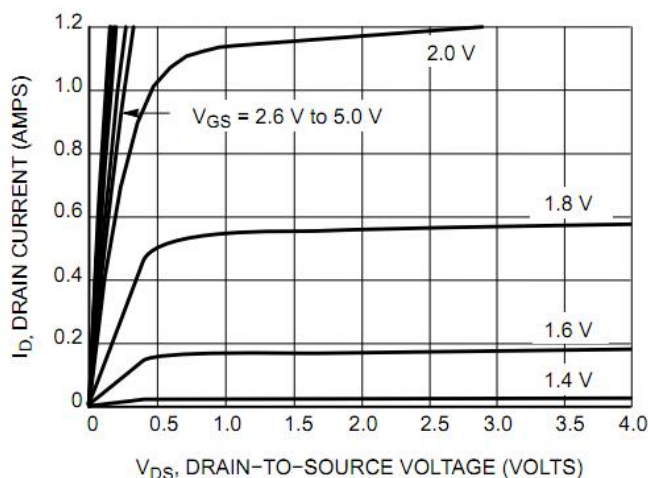


Figure 1. On-Region Characteristics

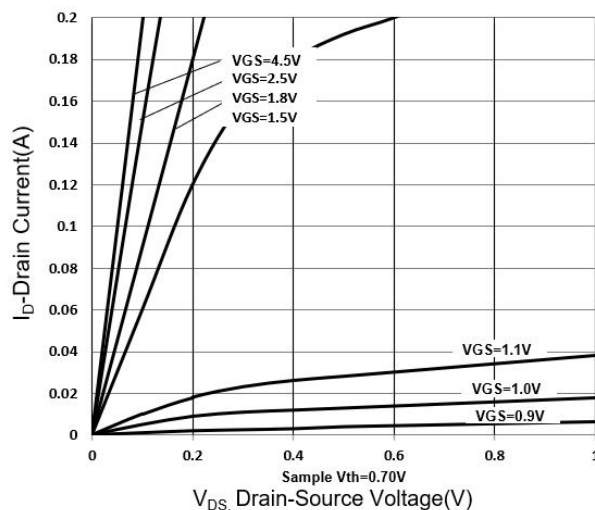


Figure 2. Output Characteristics

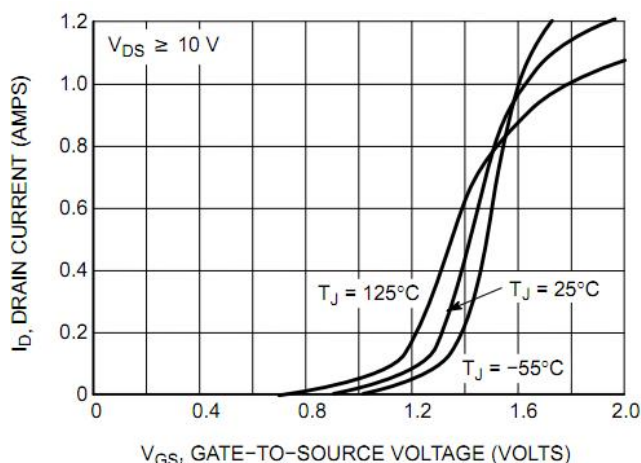


Figure 3. Transfer Characteristics

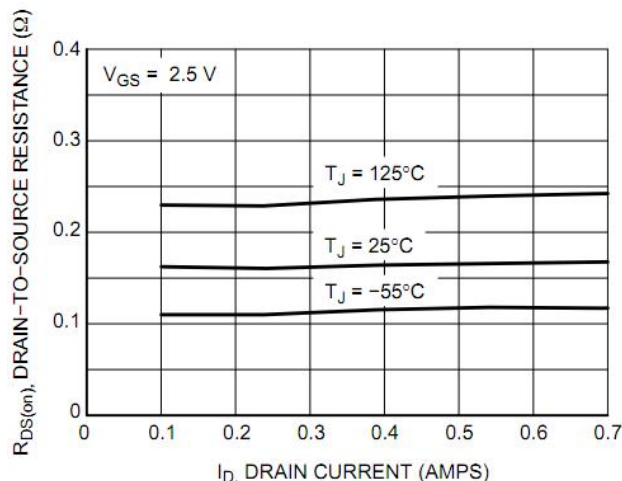


Figure 4. On-Resistance vs. Drain Current and Temperature

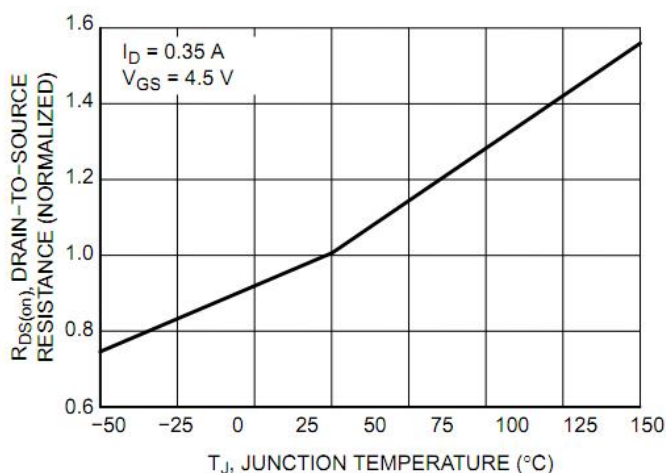


Figure 5. On-Resistance Variation with Temperature

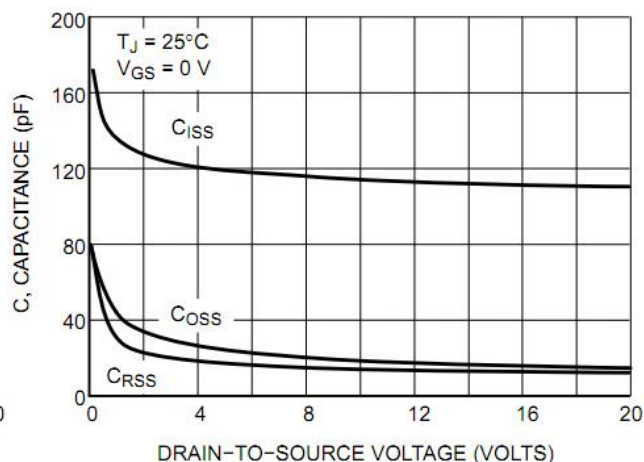


Figure 6. Capacitance Variation

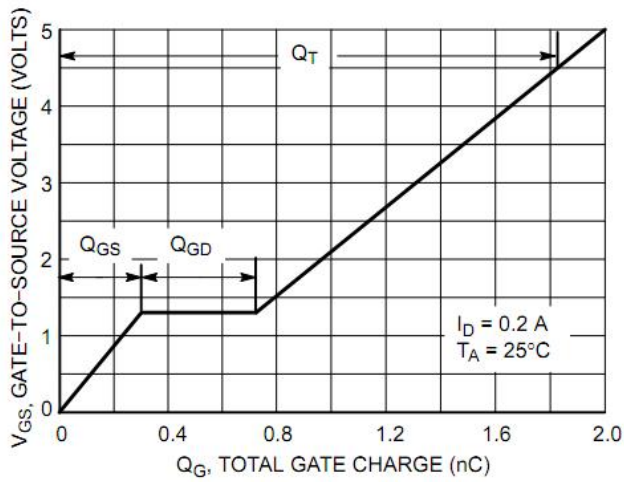


Figure 7. Gate-to-Source Voltage vs. Total Gate Charge

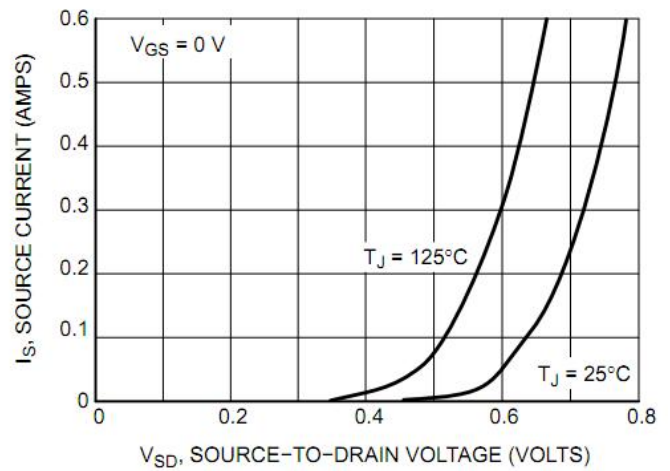


Figure 8. Diode Forward Voltage vs. Current

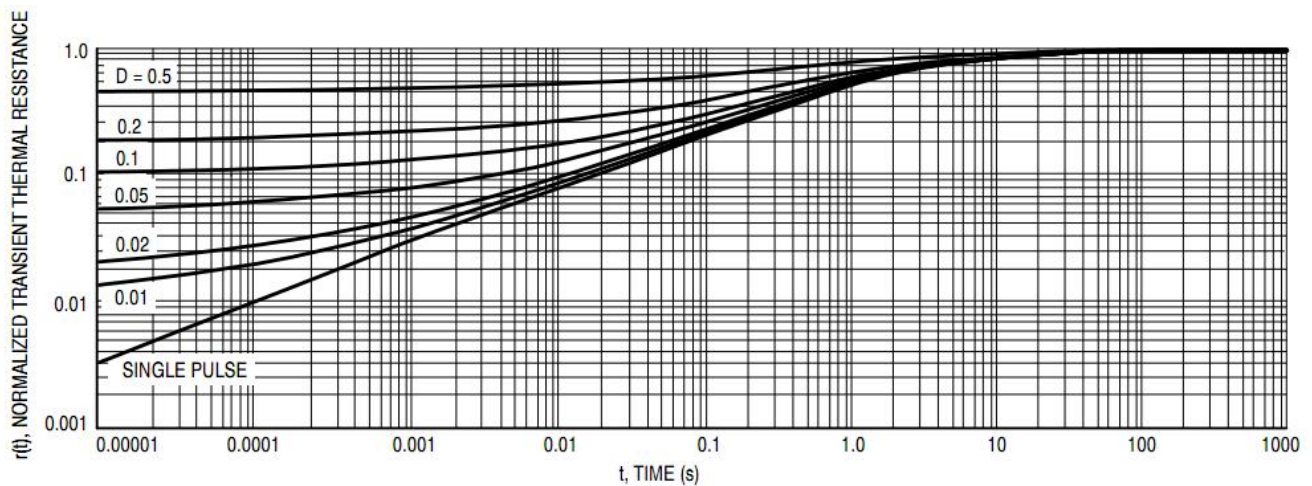
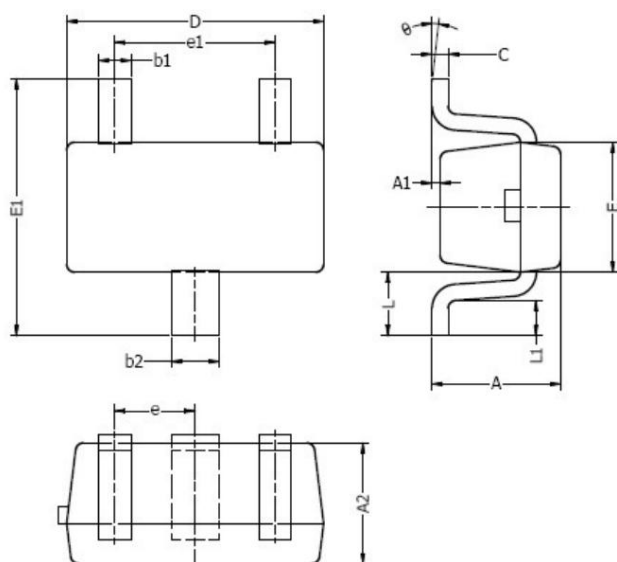


Figure 9. Normalized Thermal Response

8. Package Outline Dimensions

Device Marking	Device	Package	Reel size	Tape width	Quantity
N13	MN20E013	SOT-523	7inch	8mm	4000/4500



SOT-523 POD		
Symbol	Min (mm)	Max (mm)
A	0.70	0.90
A1	0.00	0.10
A2	0.70	0.80
b1	0.15	0.25
b2	0.25	0.35
c	0.10	0.20
D	1.50	1.70
E	0.70	0.90
E1	1.45	1.75
e	0.50Typ	
e1	0.90	1.10
L	0.40Ref	
L1	0.10	0.30
θ	0°	8°

9. RESTRICTIONS ON PRODUCT USE

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