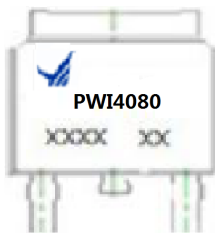


**Features**

- Fast Switching
- Low ON Resistance(  $R_{dson} \leq 5.5m\Omega$  )
- Low Gate Charge
- Low Reverse transfer capacitances
- 100% Single Pulse avalanche energy Test

**General Description**

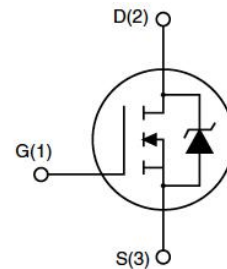
The PWI4080 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a wide variety of applications.

**Package**

Marking and pin assignment



TO-252top view



Schematic diagram

**Absolute** ( $T_c=25^\circ\text{C}$  unless otherwise specified)

Symbol	Parameter	Value	Units
$V_{DSS}$	Drain-to-Source Voltage	40	V
$I_D$	Continuous Drain Current $T_C = 25^\circ\text{C}$	80	A
	Continuous Drain Current $T_C = 100^\circ\text{C}$	42	A
$I_{DM}^{al}$	Pulsed Drain Current $T_C = 25^\circ\text{C}$	240	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$E_{AS}^{a2}$	Avalanche Energy	196	mJ
$I_{AS}^{a2}$	Avalanche Current	28	A
$P_D$	Power Dissipation $T_C = 25^\circ\text{C}$	60	W
	Derating Factor above $25^\circ\text{C}$	0.71	W/ $^\circ\text{C}$
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	-55 to 175	$^\circ\text{C}$



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

OFF Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	40	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS} = 40V, V_{GS} = 0V,$ $T_J = 25^{\circ}\text{C}$	--	--	1	$\mu A$
		$V_{DS} = 32V, V_{GS} = 0V,$ $T_J = 125^{\circ}\text{C}$	--	--	100	
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=20V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V$	--	--	-100	nA

ON Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=10V, I_D=20A$	--	5.5	7.0	m $\Omega$
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=4.5V, I_D=15A$	--	8	12	m $\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS},$ $I_D = 250\mu A$	1.1	1.50	2.40	V

Pulse width  $t_p \leq 300\mu s, \delta \leq 2\%$

Dynamic Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_g$	Gate resistance	$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$	--	2.5	--	$\Omega$
$C_{iss}$	Input Capacitance	$V_{GS} = 0V, V_{DS} = 20V$ $f = 1.0\text{MHz}$	--	2229	--	$\mu F$
$C_{oss}$	Output Capacitance		--	187	--	
$C_{rss}$	Reverse Transfer Capacitance		--	167	--	



Resistive Switching Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t <sub>d</sub> (ON)	Turn-on Delay Time	V <sub>GS</sub> =10V, R <sub>G</sub> =2Ω V <sub>DD</sub> =20V, I <sub>D</sub> =20A	--	15.4	--	ns
t <sub>r</sub>	Rise Time		--	22.8	--	
t <sub>d</sub> (OFF)	Turn-Off Delay Time		--	59.6	--	
t <sub>f</sub>	Fall Time		--	14.6	--	
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =20V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V	--	53.6	--	nC
Q <sub>gs</sub>	Gate to Source Charge		--	6.8	--	
Q <sub>gd</sub>	Gate to Drain ("Miller")Charge		--	14.2	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
I <sub>S</sub>	Continuous Source Current (Body Diode)	T <sub>C</sub> = 25 °C	--	--	80	A
I <sub>SM</sub>	Maximum Pulsed Current (Body Diode)		--	--	240	A
V <sub>SD</sub>	Diode Forward Voltage	I <sub>S</sub> =30.0A, V <sub>GS</sub> =0V	--	--	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>S</sub> =19.0A, T <sub>j</sub> = 25°	--	15	--	ns
Q <sub>rr</sub>	Reverse Recovery Charge	C dI <sub>F</sub> /dt=100A/us	--	6	--	nC
Pulse width tp≤300μs, δ≤2%						

Symbol	Parameter	Max.	Units
RθJC	Junction-to-Csae	1.43	°C/W
RθJA	Junction-to-Ambient	68.5	°C/W

Notes:a1. Repetitive rating; pulse width limited by maximum junction temperature  
a2. L=0.5mH, I<sub>D</sub>=33A, Start T<sub>J</sub>=25°C  
a3. Recommend soldering temperature defined by IPC/JEDEC J-STD 020



### Typical Characteristics

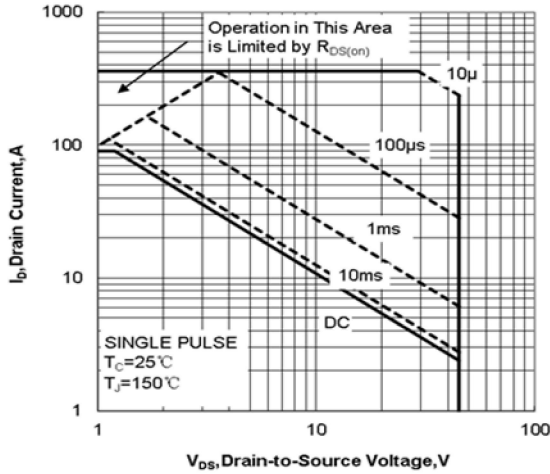


Figure 1 Maximum Forward Bias Safe Operating Area

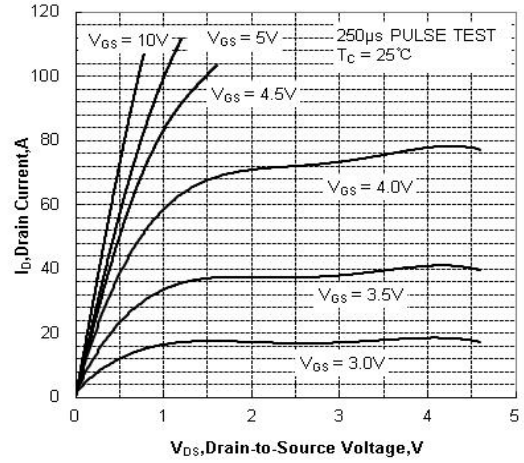


Figure 2 Typical Output Characteristics

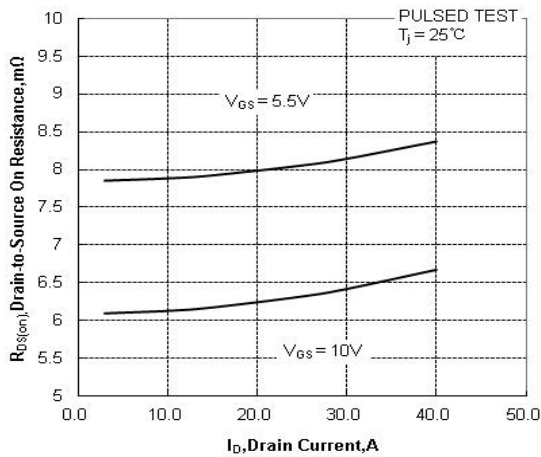


Figure 3 Typical Drain to Source ON Resistance vs Drain

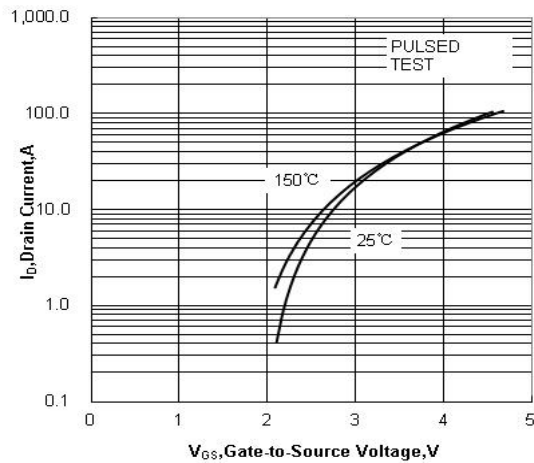


Figure 4 Typical Transfer

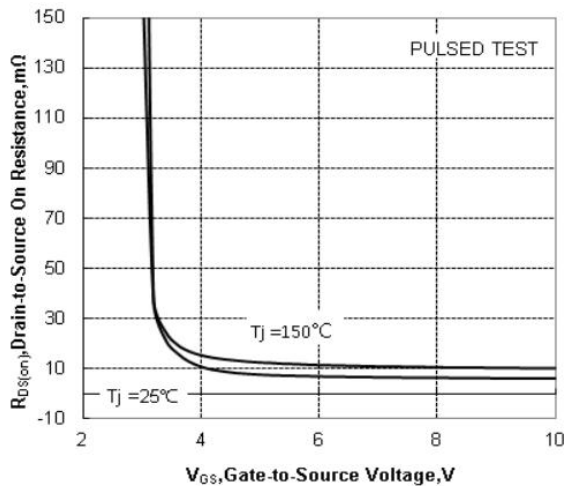


Figure 5 Drain-to-Source On Resistance vs Gate Voltage

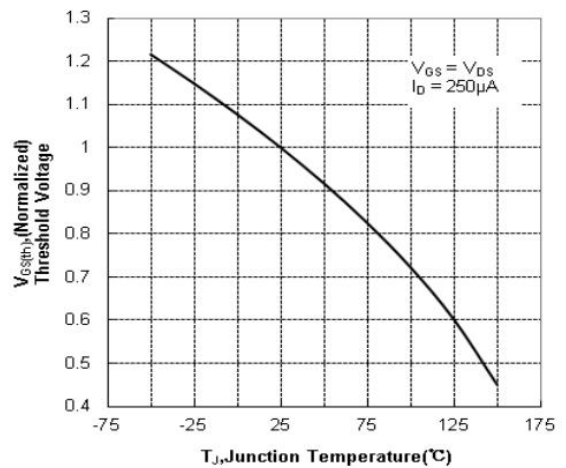


Figure 6 Typical Threshold Voltage vs Junction Temperature and Drain Current

**Test Circuit and Waveform**

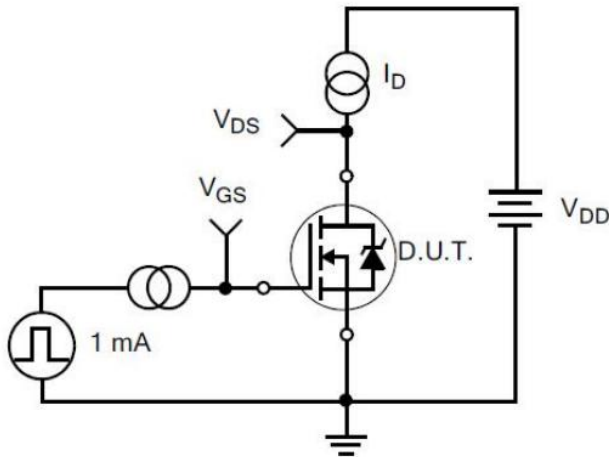


Figure 13. Gate Charge Test Circuit

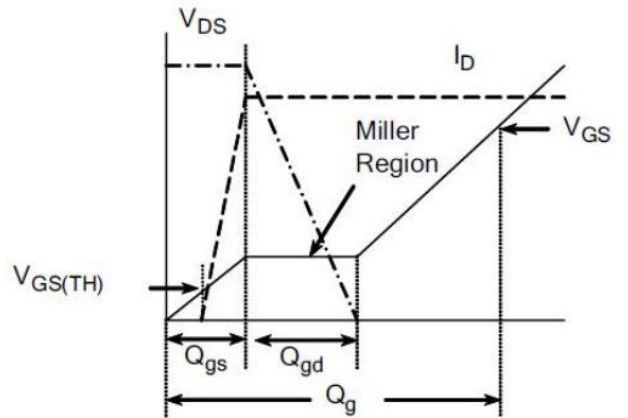


Figure 14. Gate Charge Waveforms

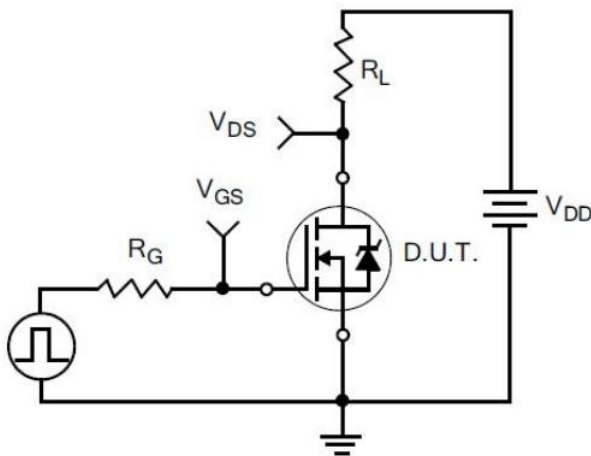


Figure 15. Resistive Switching Test Circuit

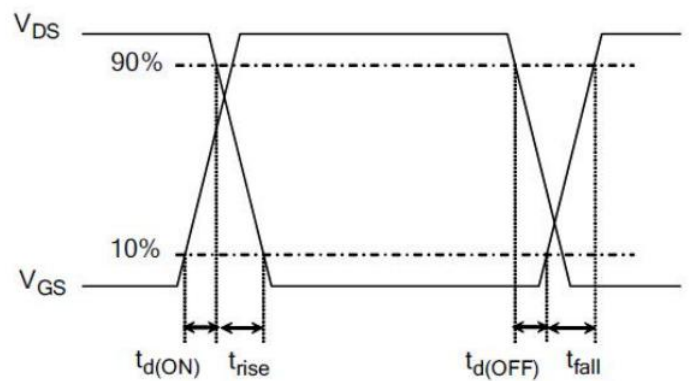


Figure 16. Resistive Switching Waveforms

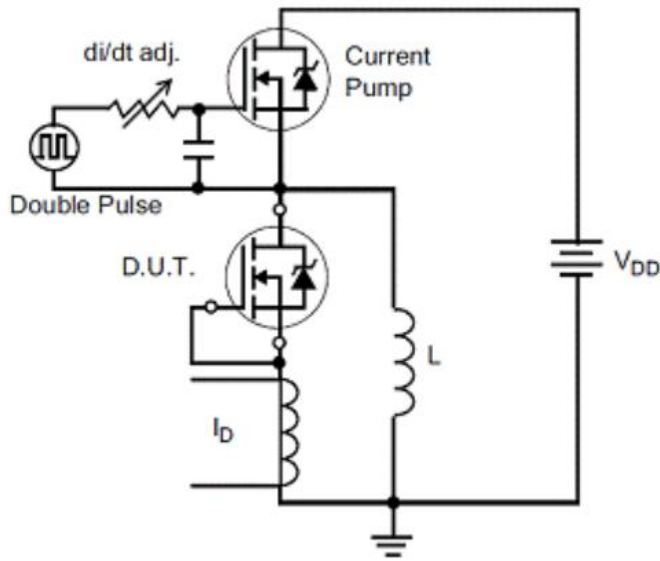


Figure 17. Diode Reverse Recovery Test Circuit

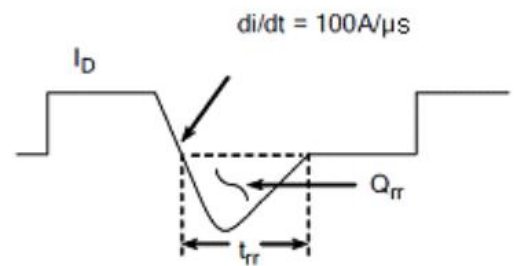


Figure 18. Diode Reverse Recovery Waveform

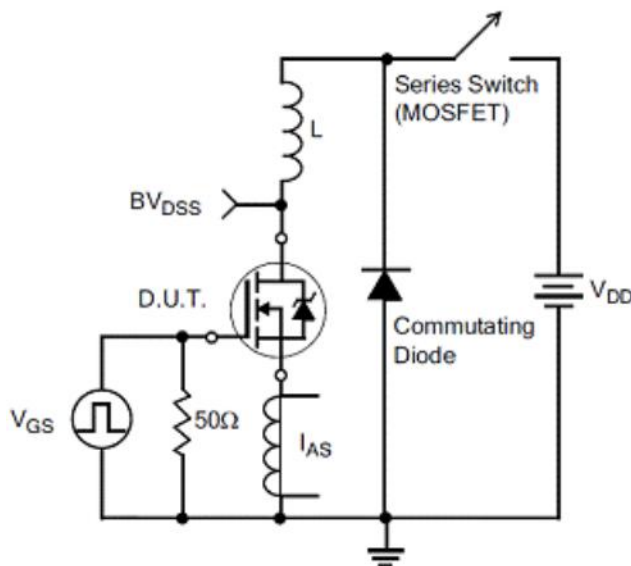


Figure19.Unclamped Inductive Switching Test Circuit

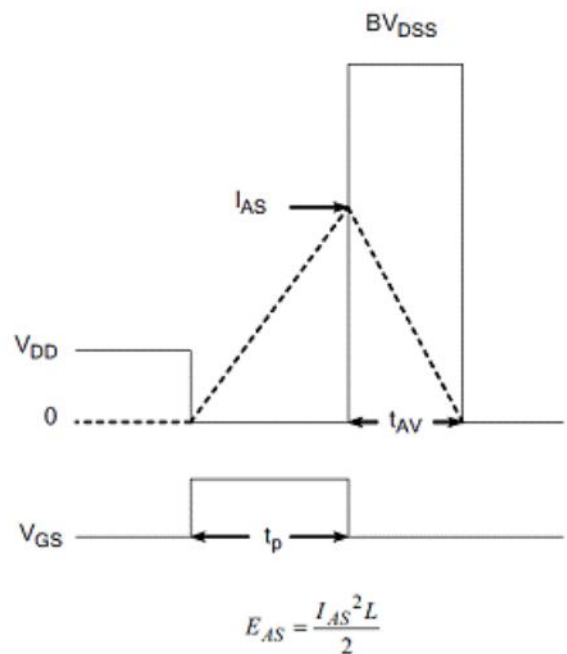
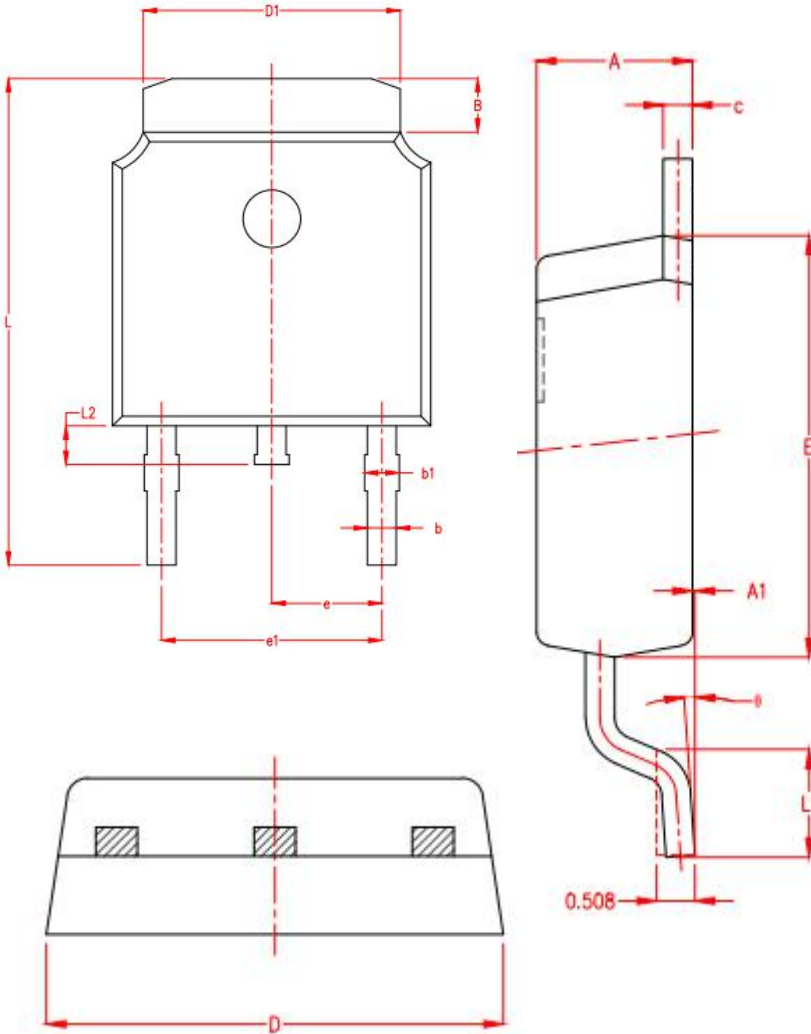


Figure20.Unclamped Inductive Switching Waveform



**TO-252 Package Information**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	2.15	2.25	2.35
A1	0.00	0.06	0.12
B	0.96	1.11	1.26
b	0.59	0.69	0.79
b1	0.69	0.81	0.93
c	0.34	0.42	0.50
D	6.45	6.60	6.75
D1	5.23	5.33	5.43
E	5.95	6.10	6.25
e	2.286TYP.		
e1	4.47	4.57	4.67
L	9.90	10.10	10.30
L1	1.40	1.55	1.70
L2	0.60	0.80	1.00
θ	0°	4°	8°