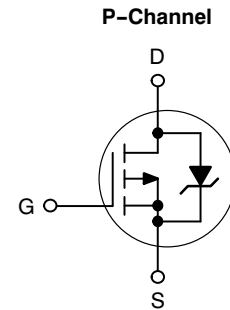


Applications

- Load Switches
- Notebook PC's
- Desktop PC's

Features

- V_{DS} (V) = -30V
- I_D = -11.4A (V_{GS} = -10V)
- $R_{DS(ON)}$ < 12m Ω (V_{GS} = -10V)
- $R_{DS(ON)}$ < 19m Ω (V_{GS} = -4.5V)
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- SOP-8 Surface Mount Package Saves Board Space



MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Rating			Symbol	Value	Unit
Drain-to-Source Voltage			V _{DSS}	−30	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current R _{θJA} (Note 1)	Steady State	T _A = 25°C	I _D	−8.9	A
		T _A = 70°C		−7.1	
Power Dissipation R _{θJA} (Note 1)		T _A = 25°C	P _D	1.52	W
Continuous Drain Current R _{θJA} (Note 2)		T _A = 25°C	I _D	−6.6	A
		T _A = 70°C		−5.3	
Power Dissipation R _{θJA} (Note 2)		T _A = 25°C	P _D	0.84	W
Continuous Drain Current R _{θJA} t < 10 s (Note 1)		T _A = 25°C	I _D	−11.4	A
		T _A = 70°C		−9.3	
Power Dissipation R _{θJA} t < 10 s (Note 1)		T _A = 25°C	P _D	2.5	W
Pulsed Drain Current	T _A = 25°C, t _p = 10 μs		I _{DM}	−46	A
Operating Junction and Storage Temperature			T _J , T _{STG}	−55 to +150	°C
Source Current (Body Diode)			I _S	−2.1	A
Single Pulse Drain-to-Source Avalanche Energy T _J = 25°C, V _{DD} = 30 V, V _{GS} = 10 V, I _L = 20 A _{pk} , L = 1.0 mH, R _G = 25 Ω			EAS	200	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T _L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. Surface-mounted on FR4 board using 1 inch sq pad size, 1 oz Cu.
2. Surface-mounted on FR4 board using the minimum recommended pad size.

THERMAL RESISTANCE RATINGS

Rating	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 3)	$R_{\theta JA}$	82	°C/W
Junction-to-Ambient – $t \leq 10$ s (Note 3)	$R_{\theta JA}$	50	
Junction-to-FOOT (Drain)	$R_{\theta JF}$	20	
Junction-to-Ambient – Steady State (Note 4)	$R_{\theta JA}$	148	

3. Surface-mounted on FR4 board using 1 inch sq pad size, 1 oz Cu.

4. Surface-mounted on FR4 board using the minimum recommended pad size.

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)jk

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
----------------	--------	----------------	-----	-----	-----	------

OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			29		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = -24\text{ V}$			-1.0	μA
		$T_J = 85^\circ\text{C}$			-5.0	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA

ON CHARACTERISTICS (Note 5)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\text{ }\mu\text{A}$	-1.5		-2.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			6.0		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -11.4\text{ A}$		10	12	m Ω
		$V_{GS} = -4.5\text{ V}, I_D = -9.1\text{ A}$		15	19	
Forward Transconductance	g_{FS}	$V_{DS} = -1.5\text{ V}, I_D = -11.4\text{ A}$		30		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -24\text{ V}$		3100		pF
Output Capacitance	C_{OSS}			550		
Reverse Transfer Capacitance	C_{RSS}			370		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V}, I_D = -11.4\text{ A}$		29		nC
Threshold Gate Charge	$Q_{G(TH)}$			3.3		
Gate-to-Source Charge	Q_{GS}			10		
Gate-to-Drain Charge	Q_{GD}			13		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -10\text{ V}, V_{DS} = -15\text{ V}, I_D = -11.4\text{ A}$		55		nC
Gate Resistance	R_G			2.0	4.0	Ω

SWITCHING CHARACTERISTICS (Note 6)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -10\text{ V}, V_{DD} = -15\text{ V}, I_D = -1.0\text{ A}, R_G = 6.0\text{ }\Omega$		18		ns
Rise Time	t_r			13		
Turn-Off Delay Time	$t_{d(OFF)}$			64		
Fall Time	t_f			36		

DRAIN-TO-SOURCE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_D = -2.1\text{ A}$	$T_J = 25^\circ\text{C}$		-0.73	-1.0	V
			$T_J = 125^\circ\text{C}$		0.54		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, dI_S/dt = 100\text{ A}/\mu\text{s}, I_S = -2.1\text{ A}$		34		ns	
Charge Time	T_a			18			
Discharge Time	T_b			16			
Reverse Recovery Time	Q_{RR}			30		nC	

5. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

6. Switching characteristics are independent of operating junction temperatures.

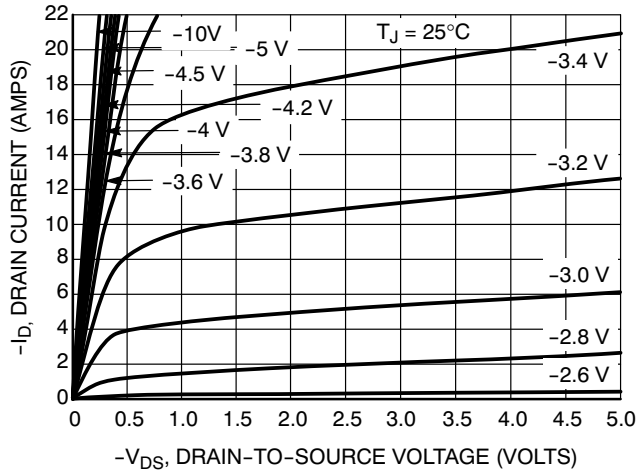


Figure 1. On-Region Characteristics

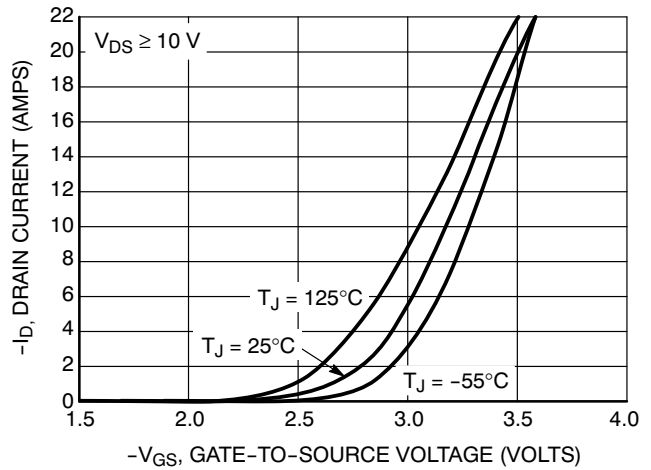


Figure 2. Transfer Characteristics

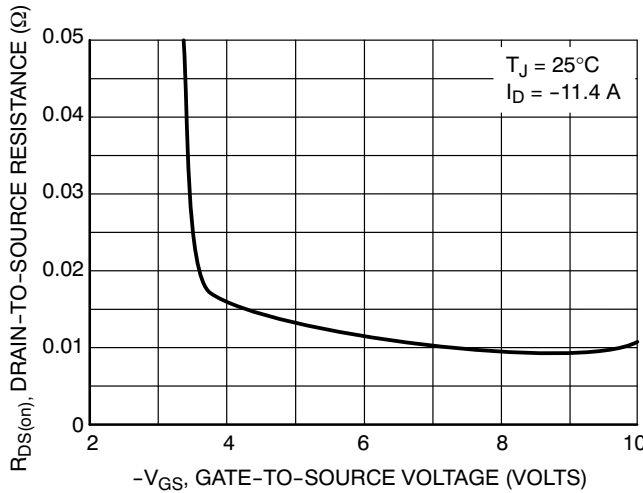


Figure 3. On-Resistance vs. Gate-to-Source Voltage

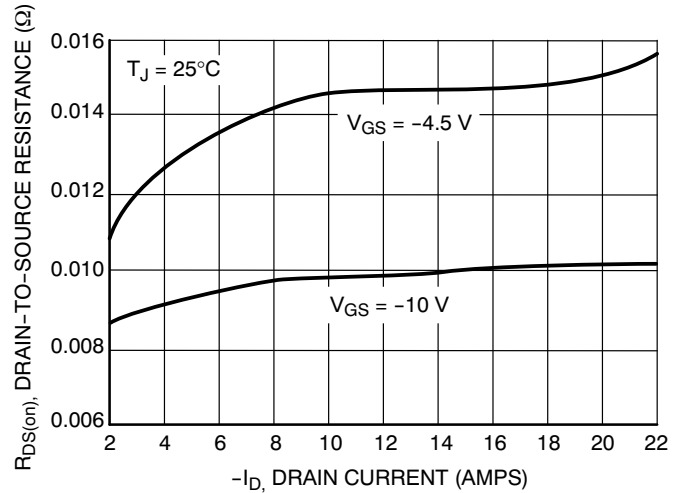


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

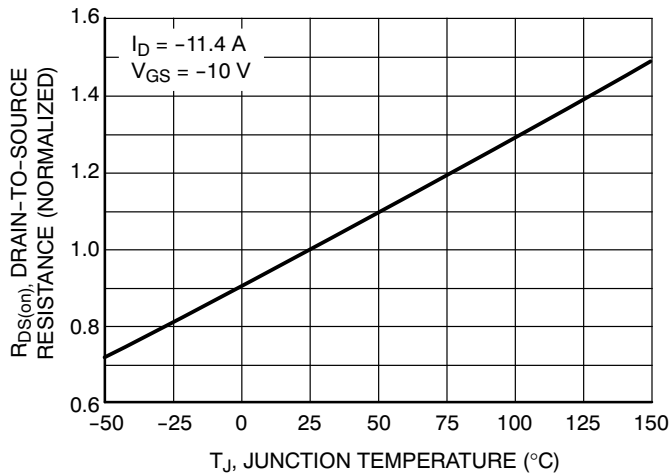


Figure 5. On-Resistance Variation with Temperature

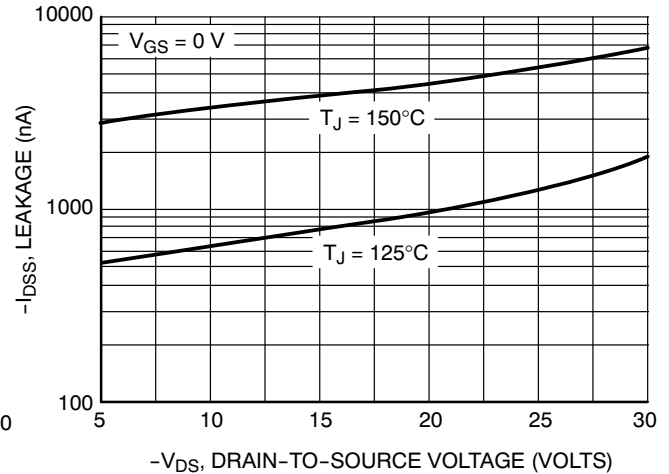


Figure 6. Drain-to-Source Leakage Current vs. Voltage

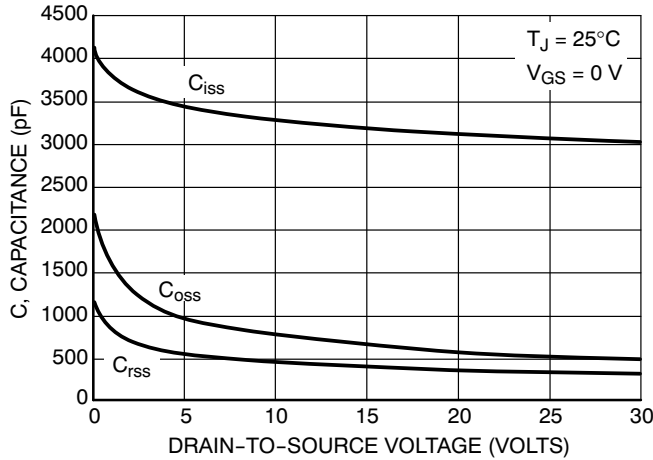


Figure 7. Capacitance Variation

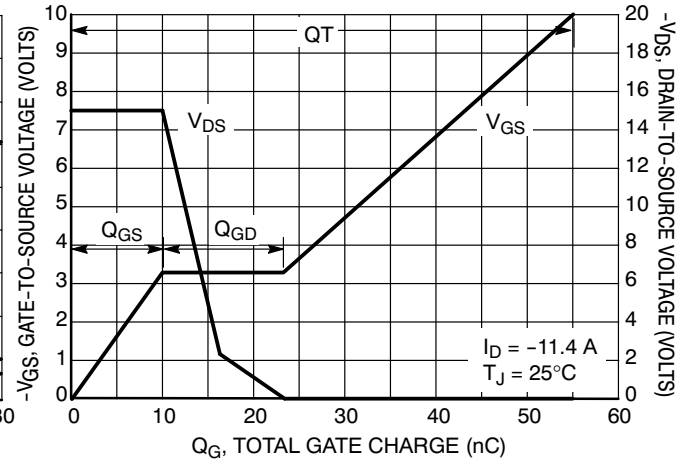


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

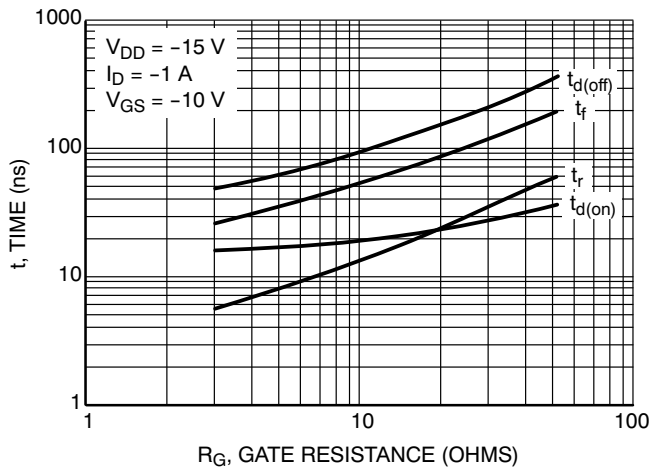


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

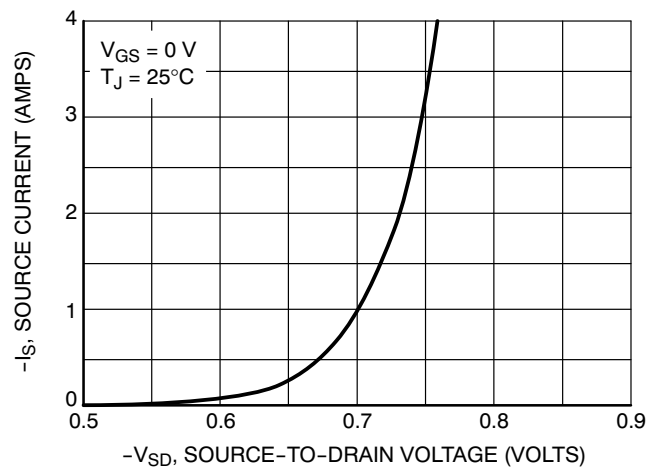


Figure 10. Diode Forward Voltage vs. Current

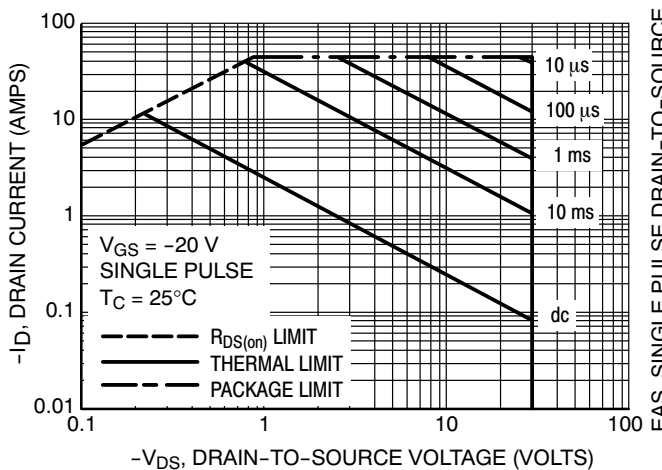


Figure 11. Maximum Rated Forward Biased Safe Operating Area

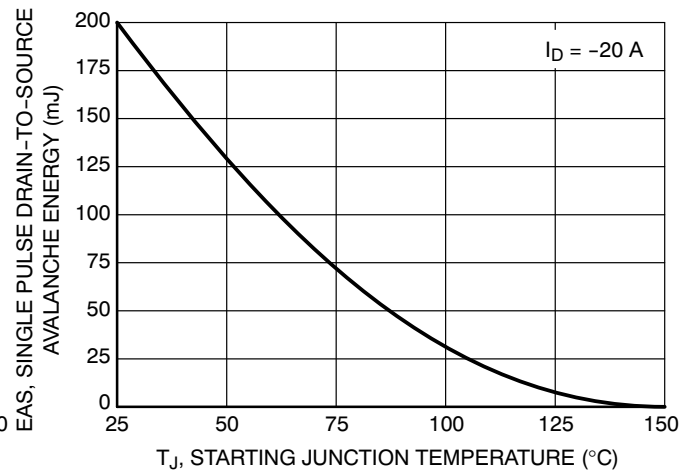
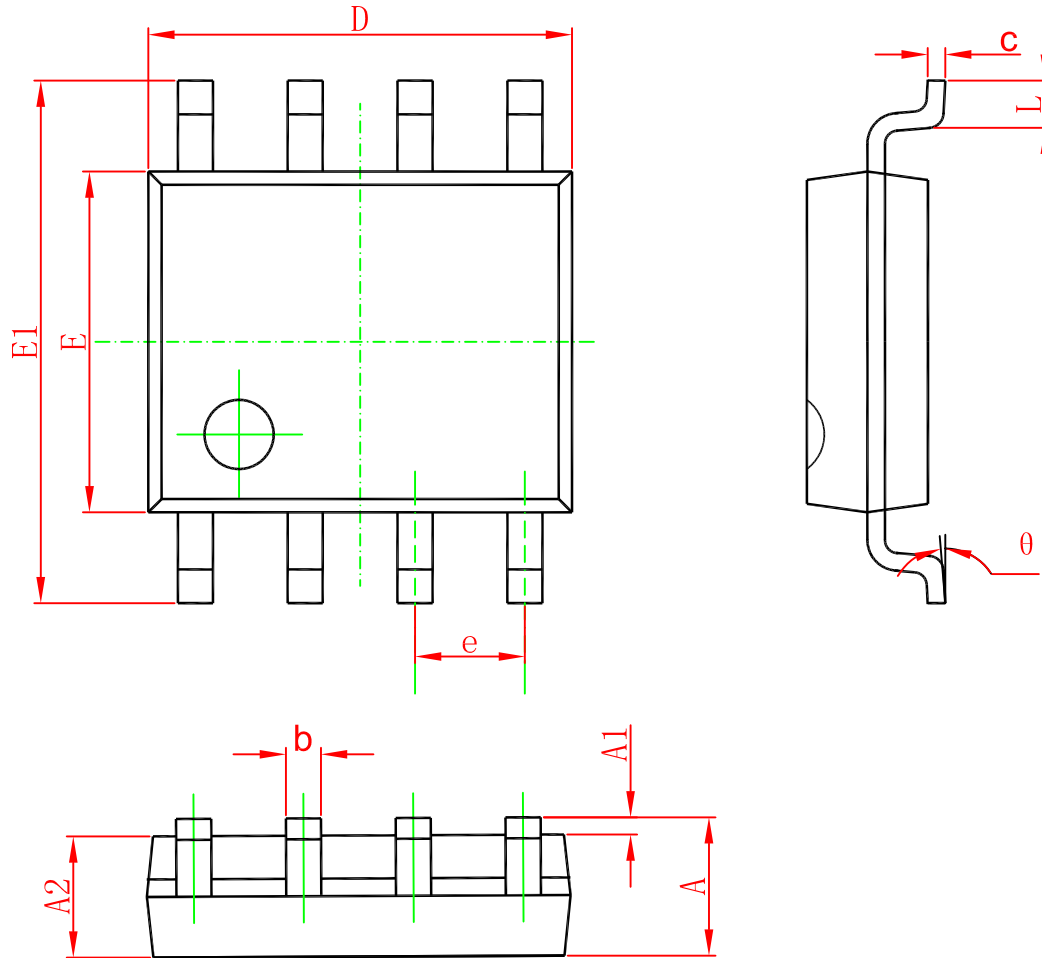


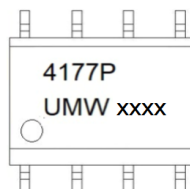
Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

Package Mechanical Data SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW NTMS4177PR	SOP-8	3000	Tape and reel