

**Features**

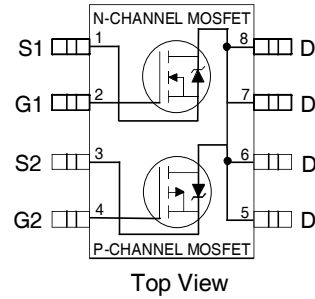
**N-Ch:**

- $V_{DS}(V)=30V$
- $R_{DS(ON)} < 29m\Omega$  ( $V_{GS} = 10V$ )
- $R_{DS(ON)} < 46 m\Omega$  ( $V_{GS} = 4.5V$ )

**P-Ch:**

- $V_{DS}(V)=-30V$
- $R_{DS(ON)} < 58m\Omega$  ( $V_{GS} = -10V$ )
- $R_{DS(ON)} < 98 m\Omega$  ( $V_{GS} = -4.5V$ )

- Generation V Technology
- Ultra Low On-Resistance
- Complimentary Half Bridge
- Surface Mount
- Fully Avalanche Rated
- Lead-Free



**Description**

The SOP-8 has been modified through a customized eadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements. multiple devices can be used in an application with dramatically reduced board space. The package is designed for vapor phase, inra red, orwave soldering technigues

**Absolute Maximum Ratings (  $T_A = 25^\circ C$  Unless Otherwise Noted)**

	Symbol	Maximum		Units
		N-Channel	P-Channel	
Drain-Source Voltage	$V_{DS}$	30	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current <sup>Ⓢ</sup>	$I_D$	$T_A = 25^\circ C$	7.3	-5.3
		$T_A = 70^\circ C$	5.9	-4.2
Pulsed Drain Current	$I_{DM}$	30	-30	A
Continuous Source Current (Diode Conduction)	$I_S$	2.5	-2.5	
Maximum Power Dissipation <sup>Ⓢ</sup>	$P_D$	$T_A = 25^\circ C$	2.5	
		$T_A = 70^\circ C$	1.6	
Single Pulse Avalanche Energy	$E_{AS}$	82	140	mJ
Avalanche Current	$I_{AR}$	4.0	-2.8	A
Repetitive Avalanche Energy	$E_{AR}$	0.20		mJ
Peak Diode Recovery dv/dt <sup>Ⓢ</sup>	dv/dt	3.8	-2.2	V/ ns
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to + 150 °C		

**Thermal Resistance Ratings**

Parameter	Symbol	Limit	Units
Maximum Junction-to-Ambient <sup>Ⓢ</sup>	$R_{\theta JA}$	50	$^\circ C/W$

### Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)DSS</sub>	N-Ch 30 P-Ch -30			V	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA
ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub>	N-Ch P-Ch	0.022		V/°C	Reference to 25°C, I <sub>D</sub> = 1mA Reference to 25°C, I <sub>D</sub> = -1mA
R <sub>DS(ON)</sub>	N-Ch P-Ch	23 32	29 46	mΩ	V <sub>GS</sub> = 10V, I <sub>D</sub> = 5.8A ④ V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4.7A ④ V <sub>GS</sub> = -10V, I <sub>D</sub> = -4.9A ④ V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3.6A ④
V <sub>GS(th)</sub>	N-Ch 1.0 P-Ch -1.0			V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA
g <sub>fs</sub>	N-Ch — 14 — P-Ch — 7.7 —			S	V <sub>DS</sub> = 15V, I <sub>D</sub> = 5.8A ④ V <sub>DS</sub> = -15V, I <sub>D</sub> = -4.9A ④
I <sub>DSS</sub>	N-Ch — — 1.0 P-Ch — — -1.0			μA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V
I <sub>GSS</sub>	N-Ch — — 25 P-Ch — — -25			nA	V <sub>DS</sub> = 24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C V <sub>DS</sub> = -24V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 55°C
Q <sub>g</sub>	N-P — — ±100				V <sub>GS</sub> = ±20V
Q <sub>gs</sub>	N-Ch — 22 33 P-Ch — 23 34			nC	N-Channel I <sub>D</sub> = 5.8A, V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V ④
Q <sub>gd</sub>					P-Channel I <sub>D</sub> = -4.9A, V <sub>DS</sub> = -15V, V <sub>GS</sub> = -10V
t <sub>d(on)</sub>	N-Ch — 8.1 12 P-Ch — 13 19			ns	N-Channel V <sub>DD</sub> = 15V, I <sub>D</sub> = 1.0A, R <sub>G</sub> = 6.0Ω, R <sub>D</sub> = 15Ω ④
t <sub>r</sub>	N-Ch — 8.9 13 P-Ch — 13 20				
t <sub>d(off)</sub>	N-Ch — 26 39 P-Ch — 34 51				P-Channel V <sub>DD</sub> = -15V, I <sub>D</sub> = -1.0A, R <sub>G</sub> = 6.0Ω, R <sub>D</sub> = 15Ω
t <sub>f</sub>	N-Ch — 17 26 P-Ch — 32 48				
C <sub>iss</sub>	N-Ch — 650 — P-Ch — 710 —			pF	N-Channel V <sub>GS</sub> = 0V, V <sub>DS</sub> = 25V, f = 1.0MHz
C <sub>oss</sub>	N-Ch — 320 — P-Ch — 380 —				P-Channel V <sub>GS</sub> = 0V, V <sub>DS</sub> = -25V, f = 1.0MHz
C <sub>rss</sub>	N-Ch — 130 — P-Ch — 180 —				

### Source-Drain Ratings and Characteristics

Parameter	Min.	Typ.	Max.	Units	Conditions
I <sub>S</sub>	N-Ch — — 2.5 P-Ch — — -2.5			A	
I <sub>SM</sub>	N-Ch — — 30 P-Ch — — -30				
V <sub>SD</sub>	N-Ch — 0.78 1.0 P-Ch — -0.78 -1.0			V	T <sub>J</sub> = 25°C, I <sub>S</sub> = 1.7A, V <sub>GS</sub> = 0V ③ T <sub>J</sub> = 25°C, I <sub>S</sub> = -1.7A, V <sub>GS</sub> = 0V ③
t <sub>rr</sub>	N-Ch — 45 68 P-Ch — 44 66			ns	N-Channel T <sub>J</sub> = 25°C, I <sub>F</sub> = 1.7A, di/dt = 100A/μs
Q <sub>rr</sub>	N-Ch — 58 87 P-Ch — 42 63			nC	P-Channel T <sub>J</sub> = 25°C, I <sub>F</sub> = -1.7A, di/dt = 100A/μs ④

#### Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. ( See fig. 22 )
- ② N-Channel I<sub>SD</sub> ≤ 4.0A, di/dt ≤ 74A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C  
P-Channel I<sub>SD</sub> ≤ -2.8A, di/dt ≤ 150A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 150°C
- ③ N-Channel Starting T<sub>J</sub> = 25°C, L = 10mH R<sub>G</sub> = 25Ω, I<sub>AS</sub> = 4.0A. (See Figure 12)  
P-Channel Starting T<sub>J</sub> = 25°C, L = 35mH R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -2.8A.
- ④ Pulse width ≤ 300μs; duty cycle ≤ 2%.
- ⑤ Surface mounted on FR-4 board, t ≤ 10sec.

N-Channel

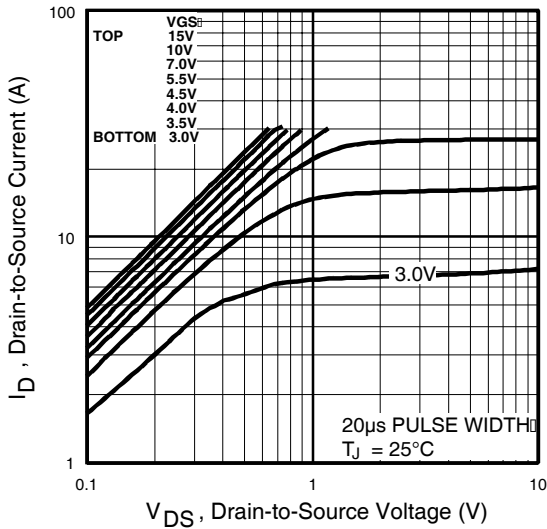


Fig 1. Typical Output Characteristics

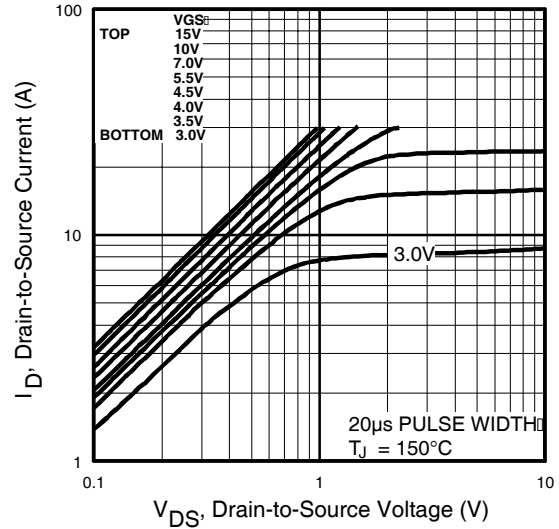


Fig 2. Typical Output Characteristics

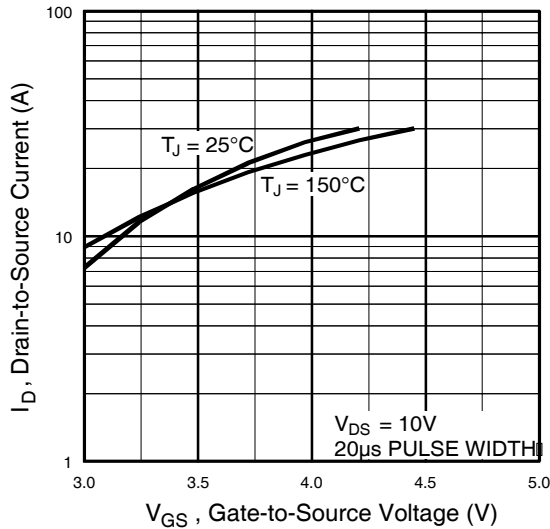


Fig 3. Typical Transfer Characteristics

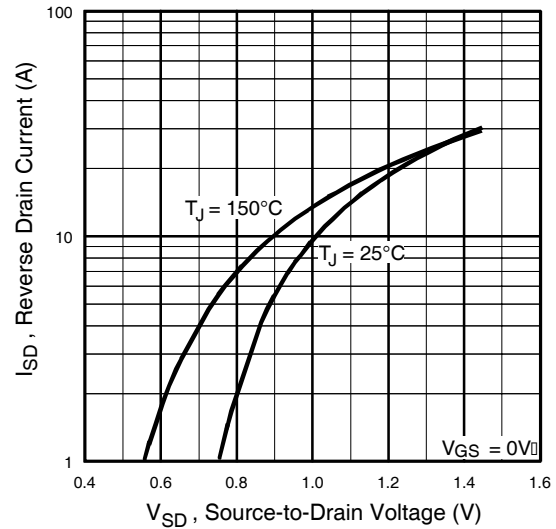
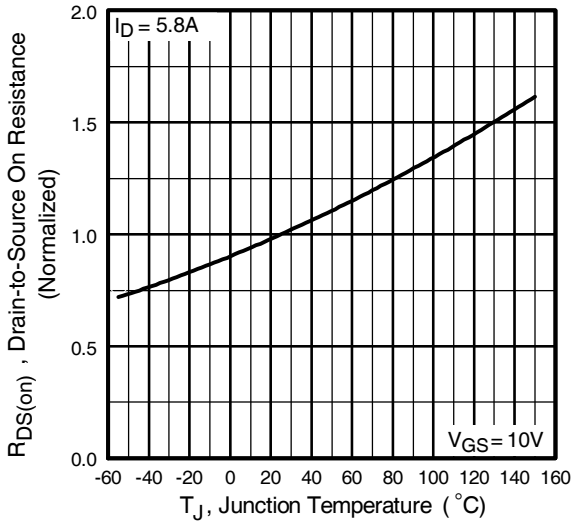
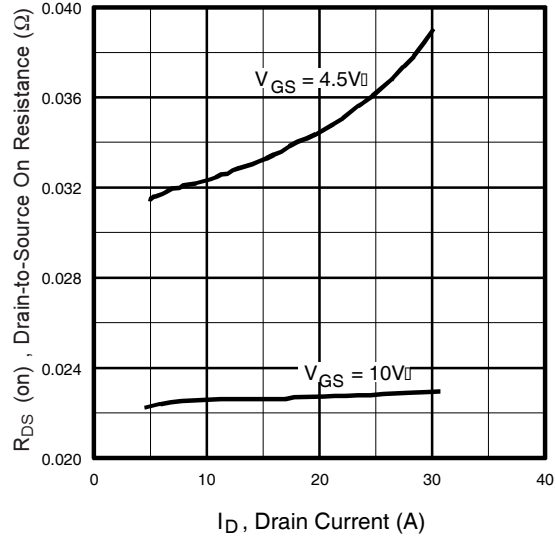


Fig 4. Typical Source-Drain Diode Forward Voltage

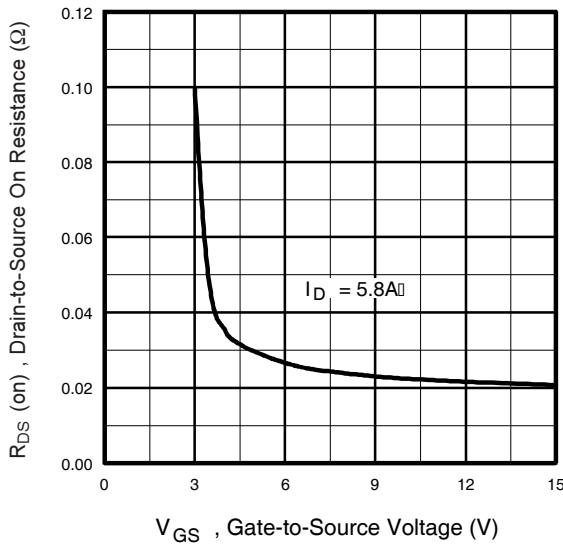
N-Channel



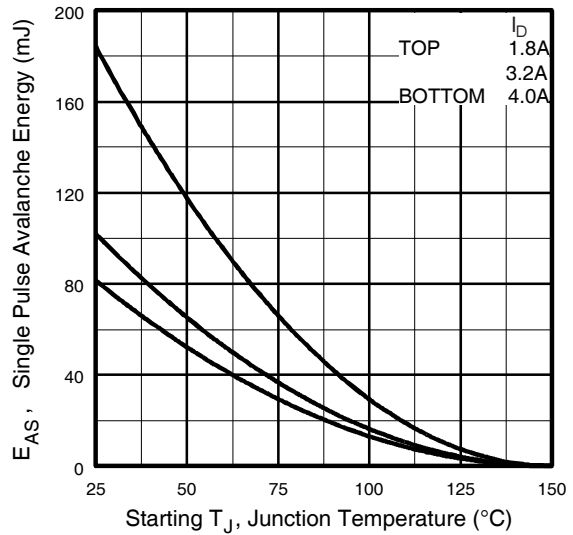
**Fig 5.** Normalized On-Resistance Vs. Temperature



**Fig 6.** Typical On-Resistance Vs. Drain Current



**Fig 7.** Typical On-Resistance Vs. Gate Voltage



**Fig 8.** Maximum Avalanche Energy Vs. Drain Current

N-Channel

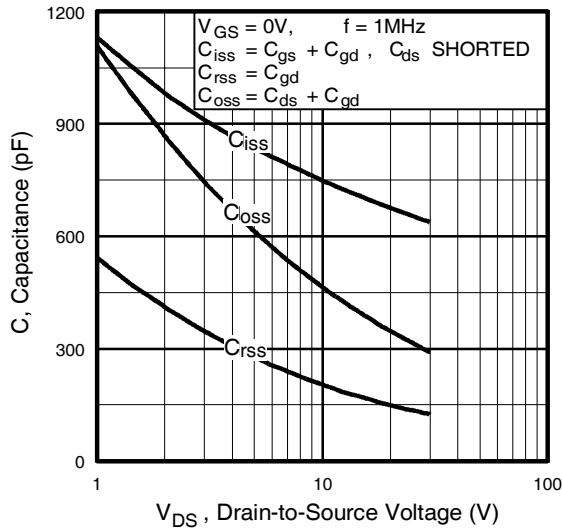


Fig 9. Typical Capacitance Vs. Drain-to-Source Voltage

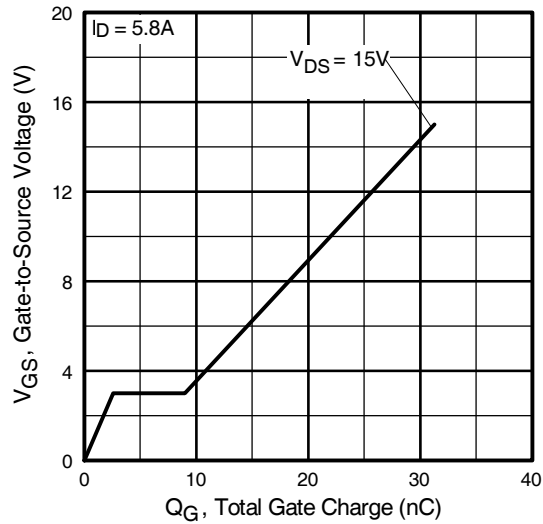


Fig 10. Typical Gate Charge Vs. Gate-to-Source Voltage

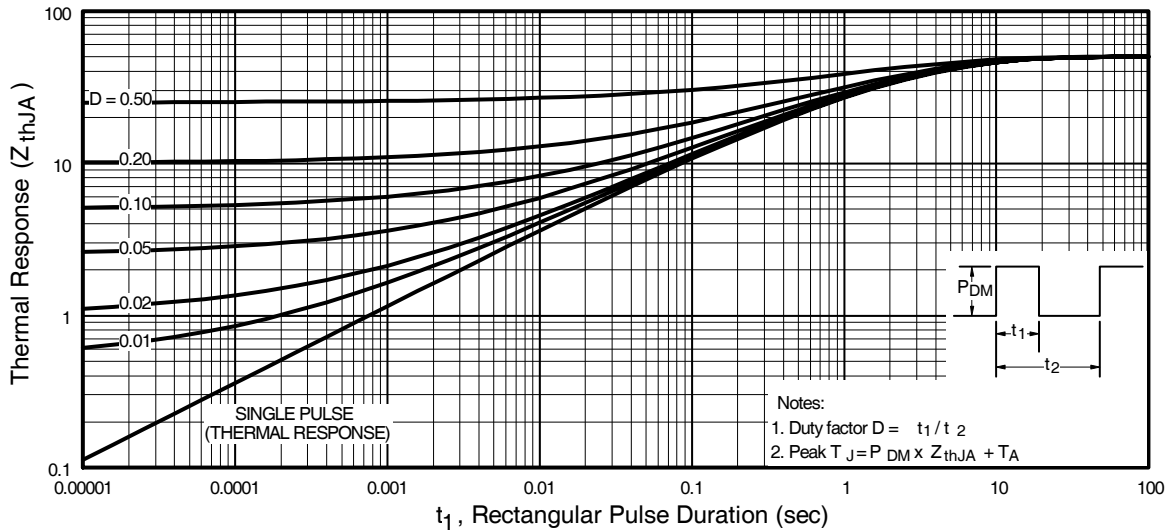


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

P-Channel

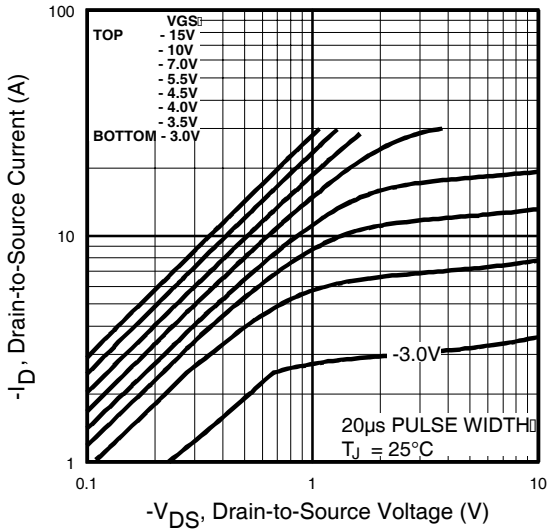


Fig 12. Typical Output Characteristics

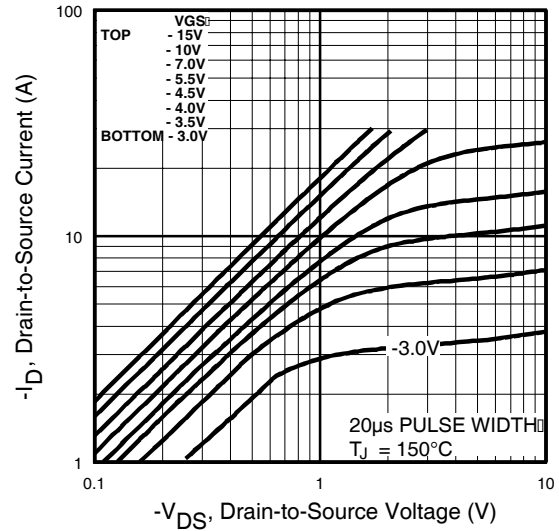


Fig 13. Typical Output Characteristics

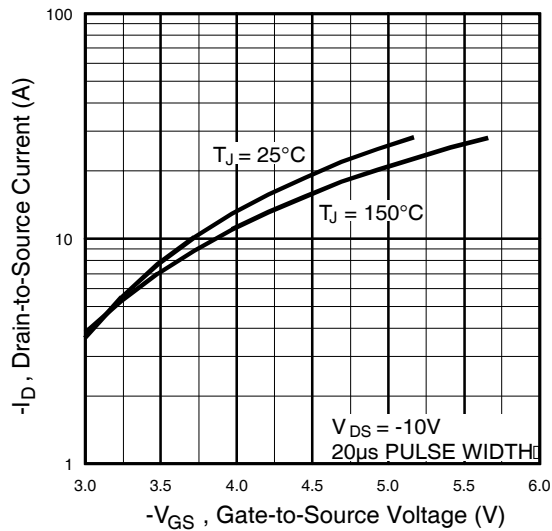


Fig 14. Typical Transfer Characteristics

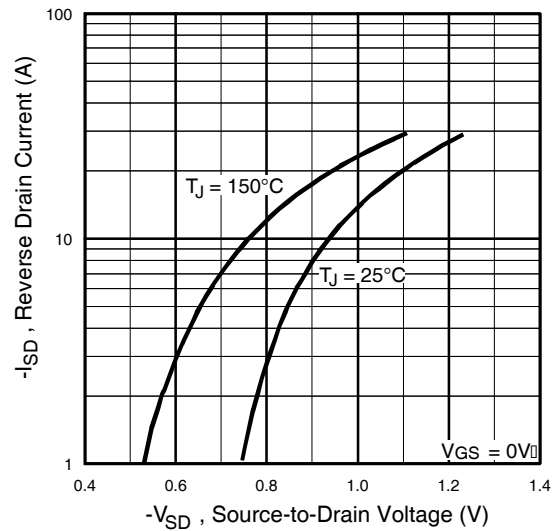


Fig 15. Typical Source-Drain Diode Forward Voltage

P-Channel

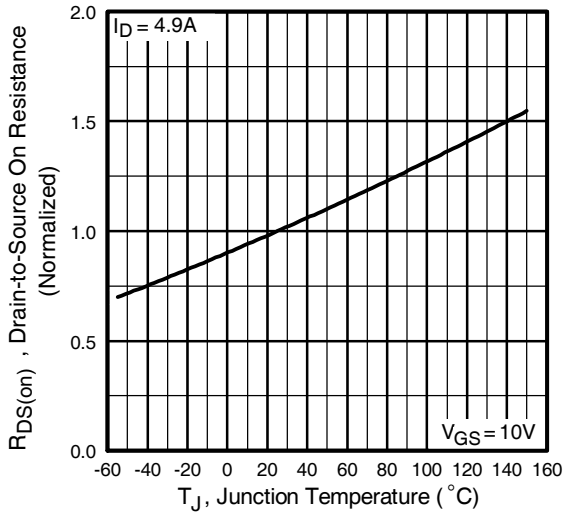


Fig 16. Normalized On-Resistance Vs. Temperature

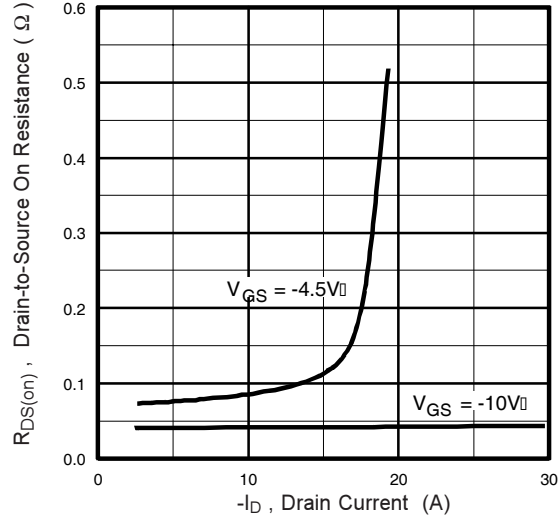


Fig 17. Typical On-Resistance Vs. Drain Current

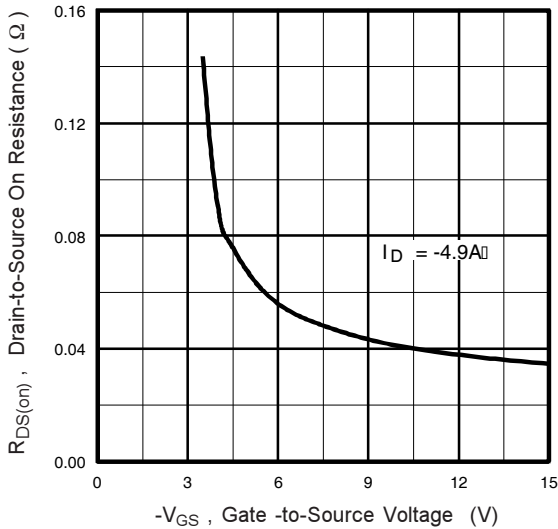


Fig 18. Typical On-Resistance Vs. Gate Voltage

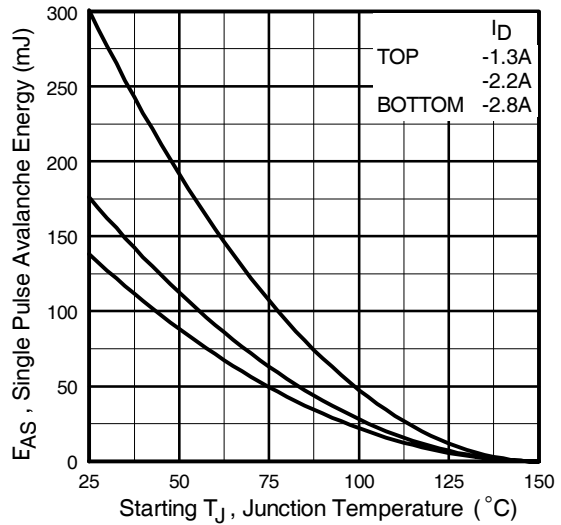


Fig 19. Maximum Avalanche Energy Vs. Drain Current

P-Channel

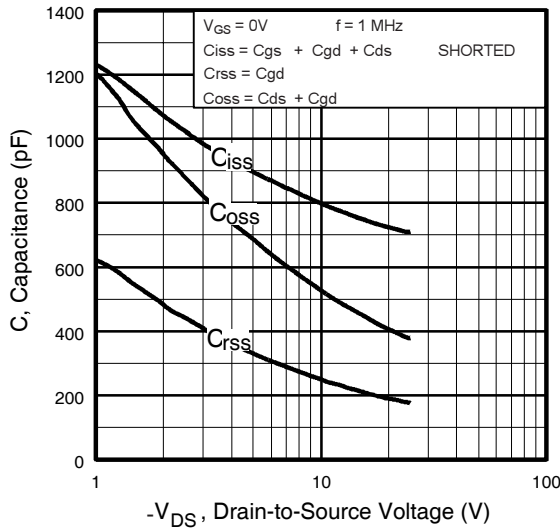


Fig 20. Typical Capacitance Vs. Drain-to-Source Voltage

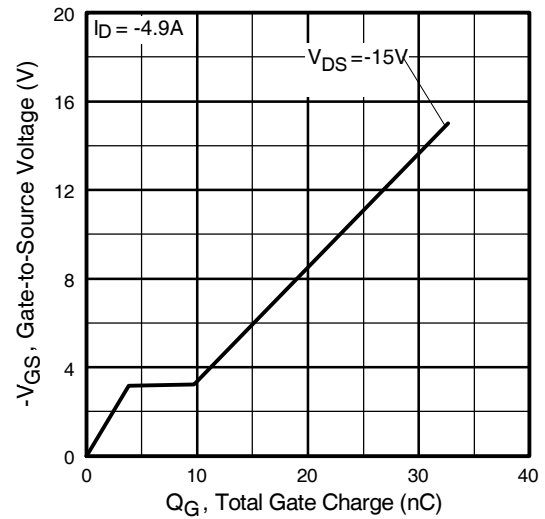


Fig 21. Typical Gate Charge Vs. Gate-to-Source Voltage

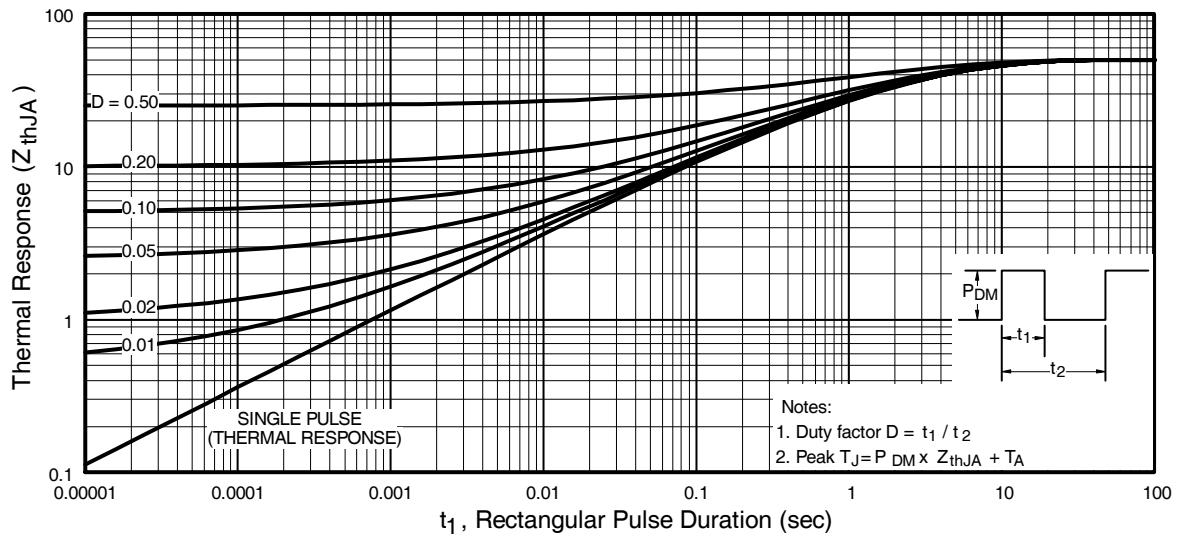
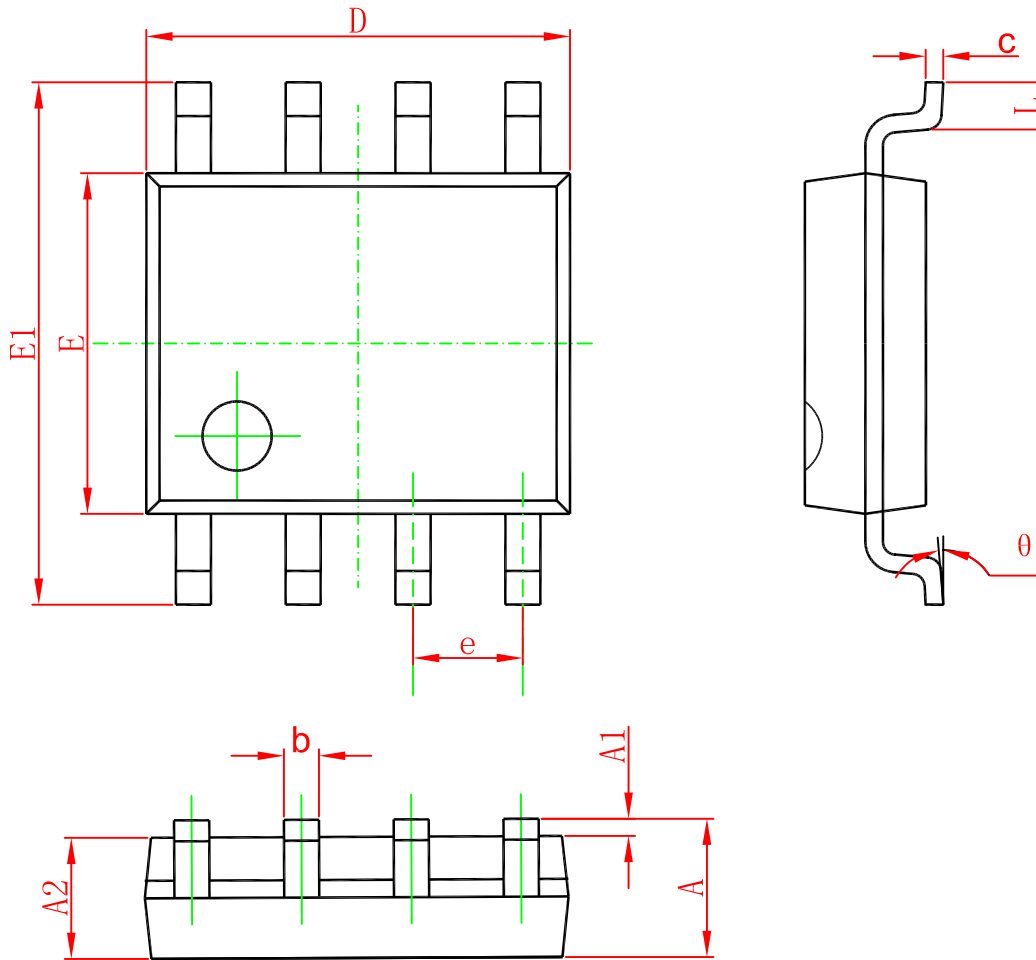


Fig 22. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

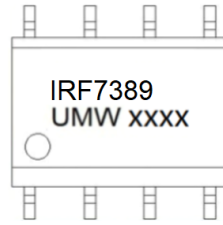


SOP-8



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 IRF7389TR	SOP-8	3000	Tape and reel