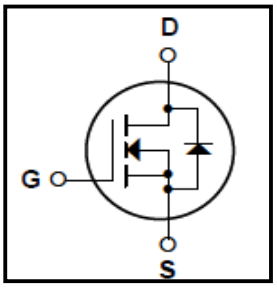
WFD20N06

Silicon N-Channel MOSFET



Features

- 20A,60V, R_{DS}(on)(Max 39mΩ)@VGS=10V
- Ultra-low Gate Charge(Typical 6.1nC)
- High Current Capability
- 100%Avalanche Tested
- Maximum Junction Temperature Range(150℃)

General Description

This Power MOSFET is produced using Winsemi's advanced planar stripe, This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics. This devices is specially well suited for high efficiency switch mode power supply. electronic Lamp ballasts based on half bridge and UPS.

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain Source Voltage	60	V
I_D	Continuous Drain Current(@Tc=25℃)	20	A
	Continuous Drain Current(@Tc=100℃)	13	A
I_{DM}	Drain Current Pulsed t_p=10us	76	A
V_{GS}	Gate to Source Voltage-Continuous	±20	V
V_{GS}	Gate to Source Voltage-Non-Repetitive(tp<10us)	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	18	mJ
Is	Source Current (Body Diode)	20	A
P_D	Total Power Dissipation(@Tc=25℃)	36	W
T_J, T_{stg}	Junction and Storage Temperature	-55~150	℃
T_L	Channel Temperature(1/8" from case for 10s)	260	℃

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	-	3.5	-	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	-	45	-	℃/W

Electrical Characteristics (Tc = 25℃)

Characteristics		Symbol	Test Condition	Min	Type	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V	-	-	±100	nA
Gate-source breakdown voltage		$V_{(BR)GSS}$	I_G = 250μA, V_{DS} = 0 V	60	-	-	V
Drain cut-off current		I_{DSS}	V_{DS}=100V, V_{GS}=0V, Tc = 25℃	-	-	1.0	μA
			V_{DS}=100V, V_{GS}=0V,Tc= 125℃	-	-	100	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	I_D = 250 μA, V_{GS} = 0 V	60	-	-	V
Break Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA,Referenced to25℃	-	60	-	mV/℃
Gate threshold voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D =250 μA	1.5	1.8	2.5	V
Drain-source ON resistance		$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 10A	-	26	39	Ω
Forward Transconductance		gfs	V_{DS} = 15 V, I_D = 10A	-	8.0	-	S
Input capacitance		C_{iss}	V_{DS} = 25 V,	-	675		pF
Reverse transfer capacitance		C_{rss}	V_{GS} = 0 V,	-	47		
Output capacitance		C_{oss}	f = 1 MHz	-	68		
Switching time	Rise time	tr	V_{DD} =48	-	12.6		ns
	Turn-on time	ton	V_{DS} = 10V	-	6.5		
	Fall time	tf	I_D =20A	-	2.4		
	Turn-off time	toff	R_G=2.5Ω	-	18.2		
Total gate charge (gate-source plus gate-drain)		Qg	V_{Ds} =48V	-	7.6		nC
Gate-source charge		Qgs	V_{GS} =10V	-	2.2	-	
Gate-drain (“miller”) Charge		Qgd	I_D =20A	-	4.3	-	

Source-Drain Ratings and Characteristics (Ta = 25℃)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I_{DR}	-	-	-	20	A
Pulse drain reverse current	I_{DRP}	-	-	-	76	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 10A, V_{GS} = 0 V	-	0.87	1.2	V
Reverse recovery time	t_{rr}	I_{DR} = 1A, V_{GS} = 0 V,	-	17	-	ns
Reverse recovery charge	Q_{rr}	dI_{DR} / dt = 100 A / μs	-	12	-	μC

Note 1. Surface-mounted on FR4 board using 1 in sq pad size(Cu area = 1.127 in sq [2 oz] including traces.
2. Pulse Test: Pulse Width ≤ 300 s, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.
This transistor is an electrostatic sensitive device, Please handle with caution

TYPICAL PERFORMANCE CURVES

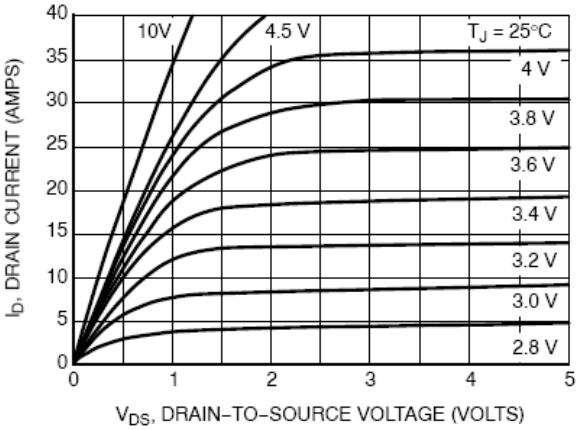


Figure 1. On–Region Characteristics

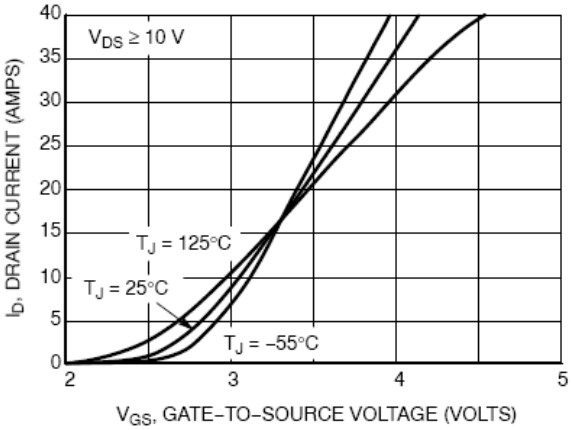


Figure 2. Transfer Characteristics

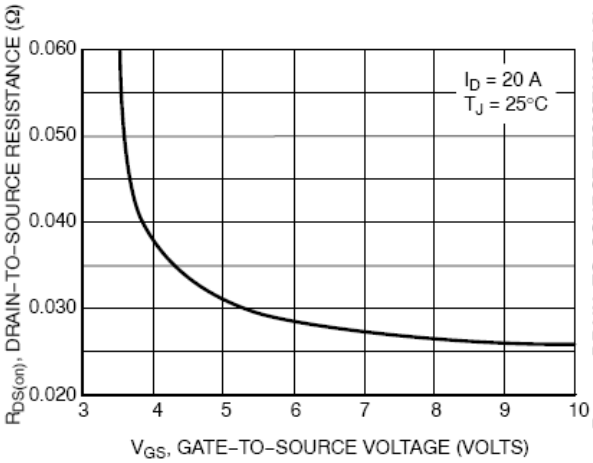


Figure 3. On–Resistance vs. Gate–to–Source Voltage

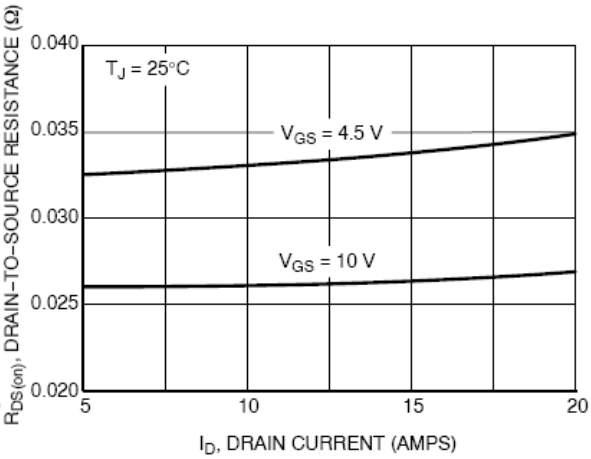


Figure 4. On–Resistance vs. Drain Current and Gate Voltage

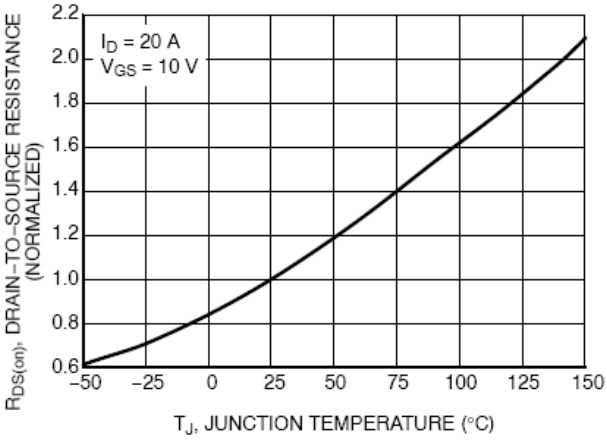


Figure 5. On–Resistance Variation with Temperature

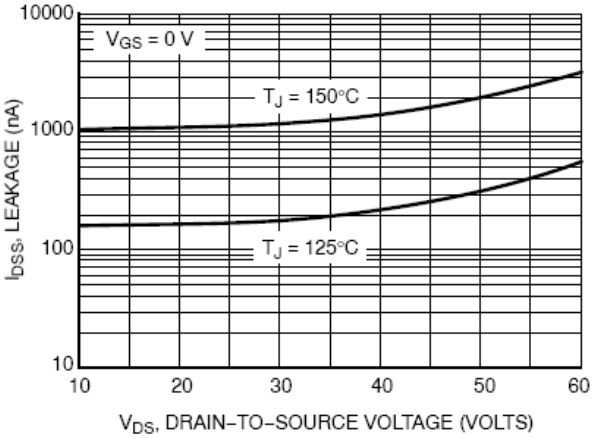


Figure 6. Drain–to–Source Leakage Current vs. Drain Voltage

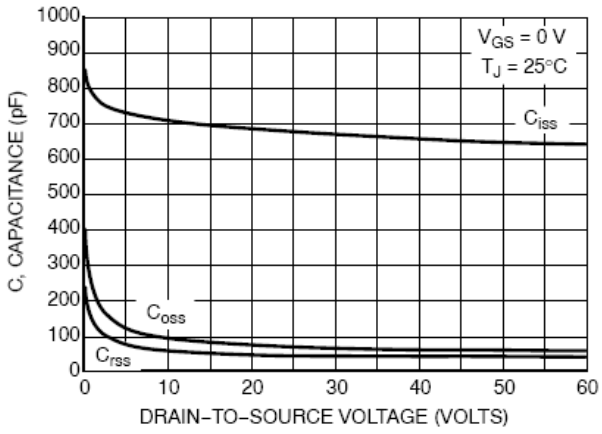


Figure 7. Capacitance Variation

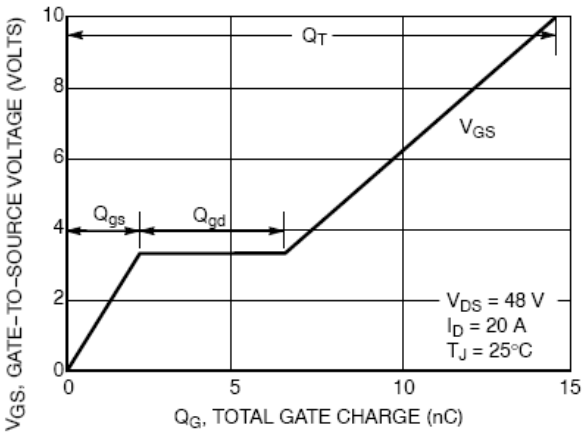


Figure 8. Gate–To–Source Voltage vs. Total Charge

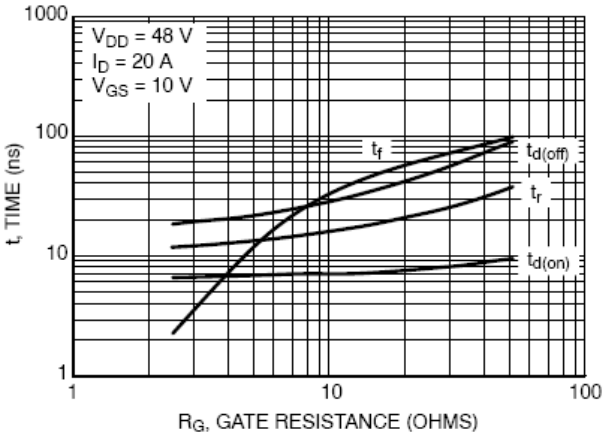


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

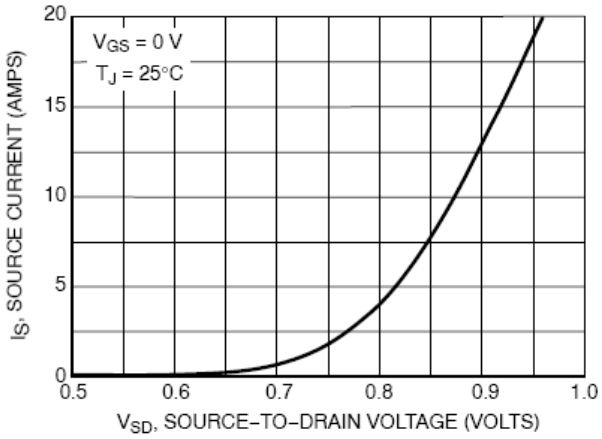


Figure 10. Diode Forward Voltage vs. Current

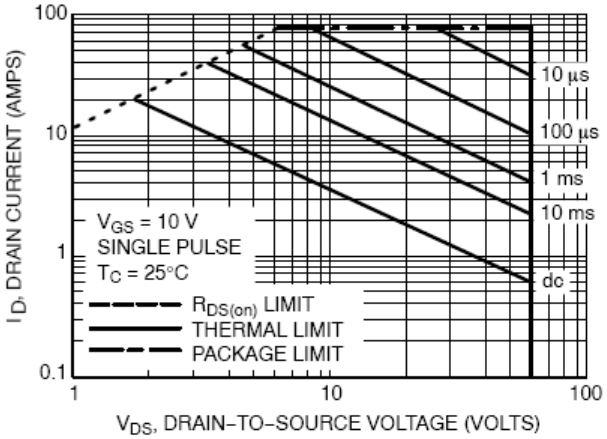


Figure 11. Maximum Rated Forward Biased Safe Operating Area

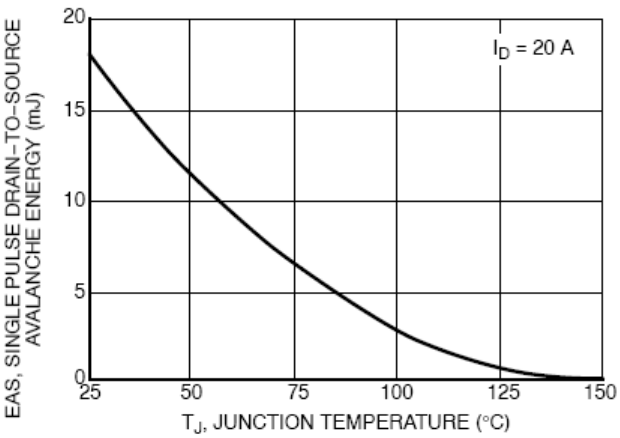


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

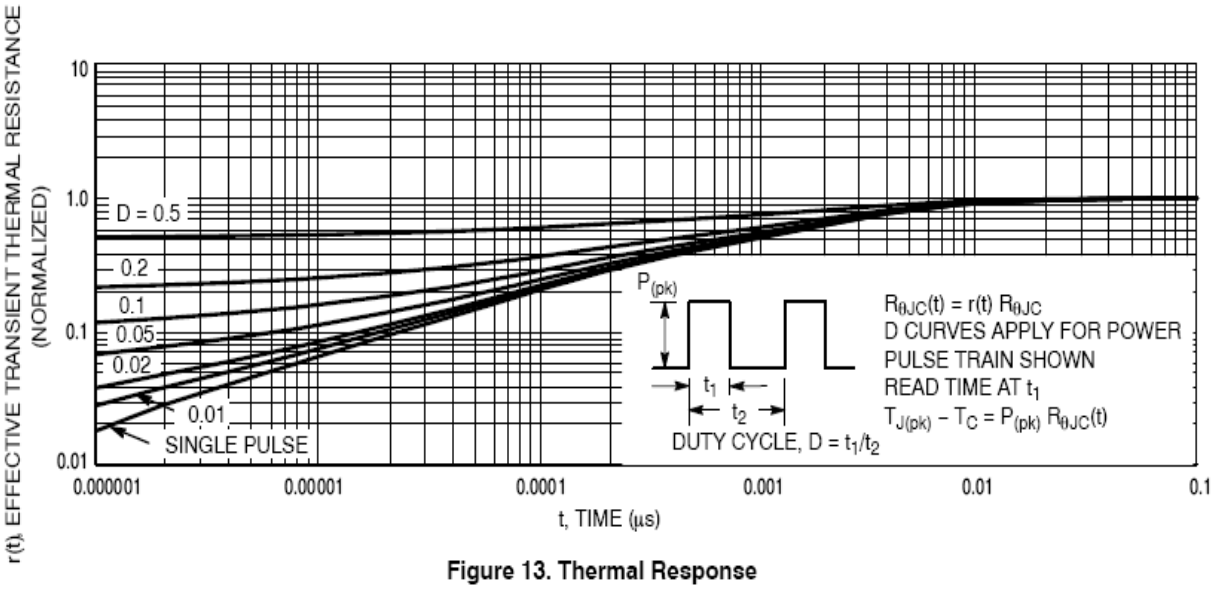
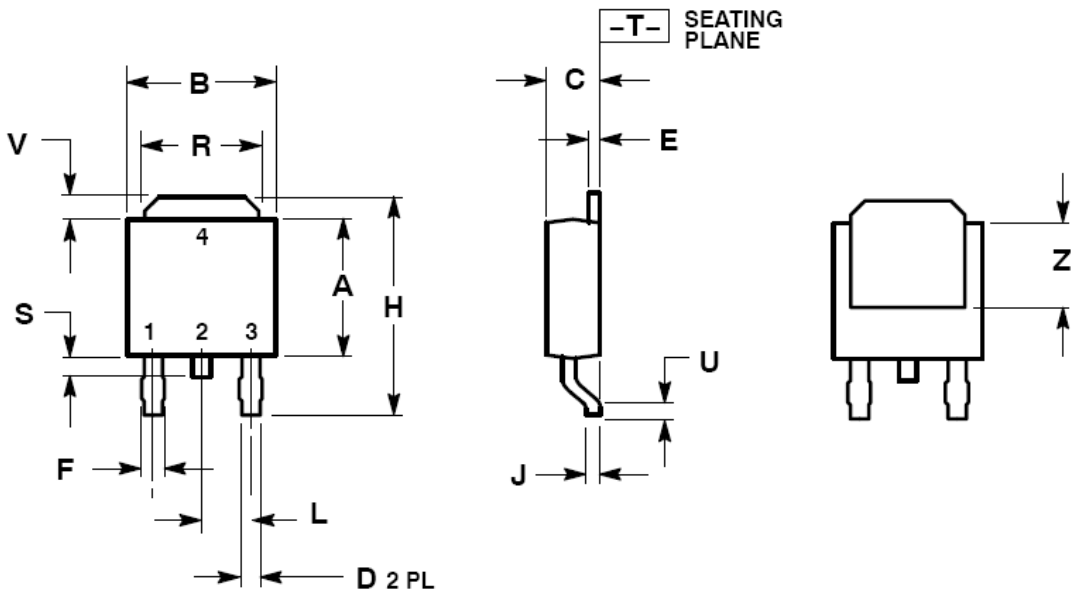


Figure 13. Thermal Response

TO252 Package Dimension



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.025	0.035	0.63	0.89
E	0.018	0.024	0.46	0.61
F	0.030	0.045	0.77	1.14
H	0.386	0.410	9.80	10.40
J	0.018	0.023	0.46	0.58
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.024	0.040	0.60	1.01
U	0.020	---	0.51	---
V	0.035	0.050	0.89	1.27
Z	0.155	---	3.93	---

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN