YANGZHOU POSITIONING TECH.CO.,LTD

IRF50N06

N-Channel PowerTrench® MOSFET
60V, 50A, 15mΩ

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Applications

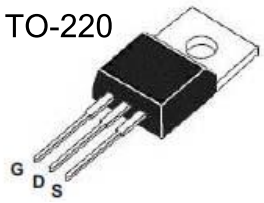
- DC/DC converters

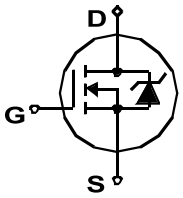
Features

- $r_{DS(ON)}$ =15mΩ, V_{GS} = 10V, I_D = 30A
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability

PIN CONFIGURATION

TO-220





MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	60	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (T_C = 25°C, V_{GS} = 10V) (Note 1)	50	A
	Continuous (T_C = 25°C, V_{GS} = 4.5V) (Note 1)	45	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	53	mJ
P_D	Power dissipation	50	W
	Derate above 25°C	0.37	W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-252	2.73	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252	100	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in^2 copper pad area	52	°C/W

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250µA, V_{GS} = 0V	60	--		V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 24V	-	-	1	µA
		V_{GS} = 0V, T_C = 150°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250µA	1.2	-	2.5	V
$r_{DS(ON)}$	Drain to Source On Resistance	I_D = 30A, V_{GS} = 10V -		-	0.015	Ω
		I_D = 35A, V_{GS} = 10V, T_J = 25°C	-	-	0.017	
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	1260	-	pF
C_{OSS}	Output Capacitance		-	260	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	150	-	pF
R_G	Gate Resistance	V_{GS} = 0.5V, f = 1MHz	-	2.3	-	Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 30A, I_g = 1.0mA	-	23	31	nC
$Q_{g(5)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V	-	13	17	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 1V	-	1.3	1.7	nC
Q_{gs}	Gate to Source Gate Charge		-	3.8	-	nC
Q_{gs2}	Gate Charge Threshold to Plateau		-	2.5	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	5.0	-	nC
Switching Characteristics (V_{GS} = 10V)						
t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 30A, V_{GS} = 10V, R_{GS} = 10Ω	-	-	147	ns
$t_{d(ON)}$	Turn-On Delay Time		-	8	-	ns
t_r	Rise Time		-	91	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	38	-	ns
t_f	Fall Time		-	32	-	ns
t_{OFF}	Turn-Off Time		-	-	108	ns
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 30A	--		1.25V	
		I_{SD} = 15A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 30A, dI_{SD}/dt = 100A/µs	-	-	27	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 30A, dI_{SD}/dt = 100A/µs	-	-	14	nC

Notes:
1: Package current limitation is 30A.
2: Starting T_J = 25°C, L = 0.14mH, I_{AS} = 25A, V_{DD} = 27V, V_{GS} = 10V.