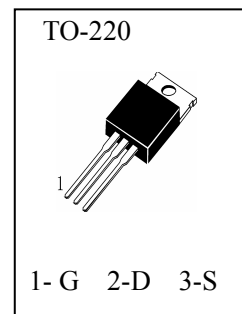




N-Channel Enhancement Mode Field Effect Transistor

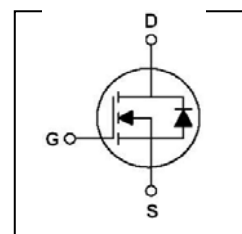
General Description

These are N-Channel enhancement mode silicon gate power field effect transistors. They are advanced power MOSFETs designed, this advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switch mode power supply, power factor correction, electronic lamp ballast based on half bridge.



Features

- 13A, 500V(See Note), $R_{DS(on)} < 0.48\Omega @ V_{GS} = 10V$
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- Equivalent Type:FQP13N50C



Maximum Ratings (Ta=25°C unless otherwise specified)

T_{stg}	Storage Temperature	-----	-55~150°C
T_j	Operating Junction Temperature	-----	150°C
V_{DSS}	Drain-Source Voltage	-----	500V
V_{GSS}	Gate-Source Voltage	-----	±30V
I_D	Drain Current (Continuous)($T_c=25^\circ C$)	-----	13A
I_{DM}	Pulsed Drain Current (Note 1)	-----	52A
P_D	Maximum Power Dissipation ($T_c=25^\circ C$)	-----	195W
	Derate Above 25°C	-----	1.56W/°C
E_{AS}	Pulsed Avalanche Energy (Note 2)	-----	860mJ
I_{AR}	Avalanche Current (Note 1)	-----	13A
E_{AR}	Repetitive Avalanche Energy (Note 1)	-----	19.5mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-----	4.5V/ns

Thermal Characteristics

Symbol	Items	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	Max 0.64	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max 62.5	°C/W

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

Symbol	Items	Min.	Typ.	Max.	Unit	Conditions
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	500			V	I _D =250μA , V _{GS} =0V
I _{DSS}	Zero Gate Voltage Drain Current			1	μA	V _{DS} =500V, V _{GS} =0V
				10	μA	V _{DS} =400V, V _{GS} =0V,T _j =125℃
I _{GSS}	Gate – Body Leakage			±100	nA	V _{GS} = ±30V , V _{DS} =0V
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	2.0		4.0	V	V _{DS} = V _{GS} , I _D =250μA
R _{DS(on)}	Static Drain-Source On-Resistance		0.39	0.48	Ω	V _{GS} =10V, I _D =6.5A
Dynamic Characteristics and Switching Characteristics						
C _{iss}	Input Capacitance		1580	2055	pF	V _{DS} = 25 V, V _{GS} = 0V, f = 1.0 MHz
C _{oss}	Output Capacitance		180	235	pF	
C _{rss}	Reverse Transfer Capacitance		20	25	pF	
t _{d(on)}	Turn - On Delay Time		25	60	nS	V _{DS} = 250V, I _D =13A, R _G = 25 Ω (Note 4,5)
tr	Rise Time		100	210	nS	
t _{d(off)}	Turn - Off Delay Time		130	270	nS	
t _f	Fall Time		100	210	nS	
Q _g	Total Gate Charge		43	56	nC	V _{DS} =400V, I _D =13A, V _{GS} = 10 V (Note 4,5)
Q _{gs}	Gate–Source Charge		7.5		nC	
Q _{gd}	Gate–Drain Charge		18.5		nC	
Drain-Source Diode Characteristics and Maximun Ratings						
I _S	Continuous Source–Drain Diode Forward Current			13	A	
I _{SM}	Pulsed Drain-Source Diode Forward Current			52	A	
V _{SD}	Source–Drain Diode Forward On–Voltage			1.4	V	I _S =13A,V _{GS} =0

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $L=6\text{mH}$, $I_{AS}=13.0\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_j=25^{\circ}\text{C}$
3. $I_{SD}\leq 13.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{S}$, $V_{DD}\leq BV_{DSS}$, Starting $T_j=25^{\circ}\text{C}$
4. Pulse Test: Pulse width $\leq 300\mu\text{S}$, Duty Cycle $\leq 2\%$
5. Essentially independent of operating temperature



Typical Characteristics

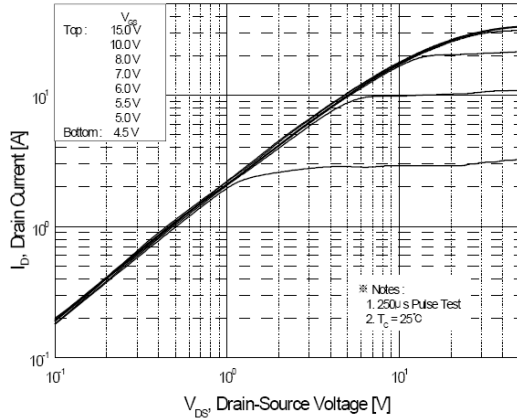


Figure 1. On-Region Characteristics

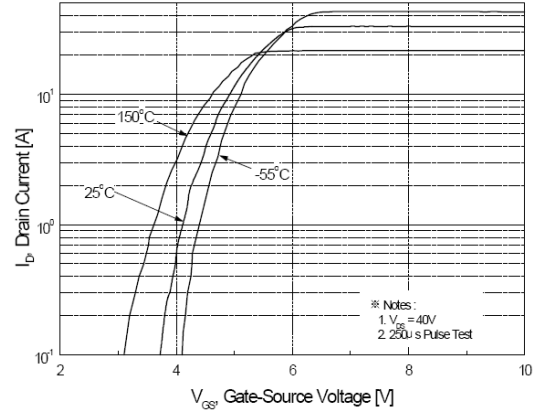


Figure 2. Transfer Characteristics

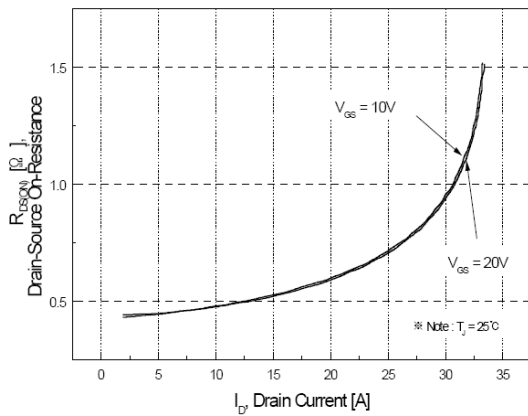


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

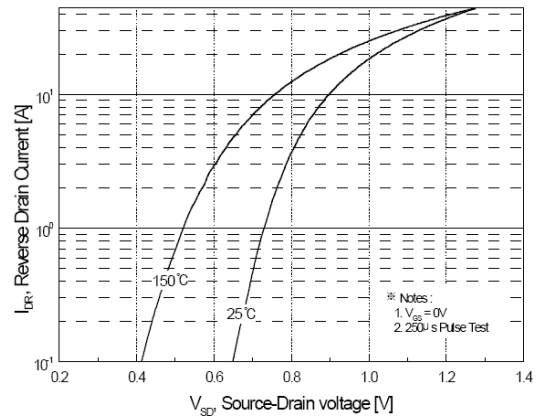


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

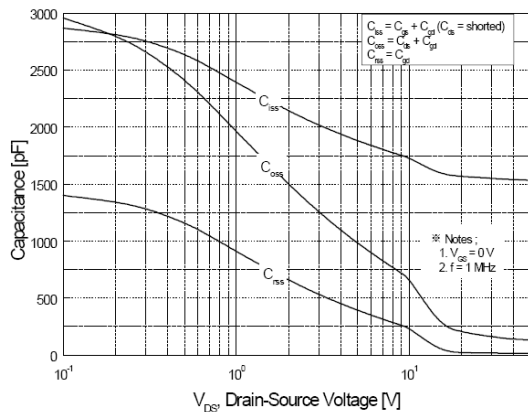


Figure 5. Capacitance Characteristics

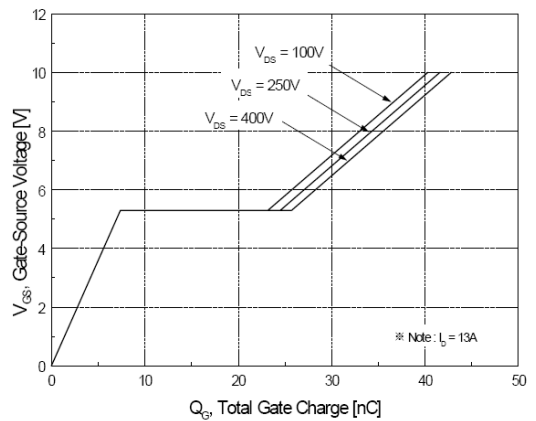


Figure 6. Gate Charge Characteristics



Typical Characteristics

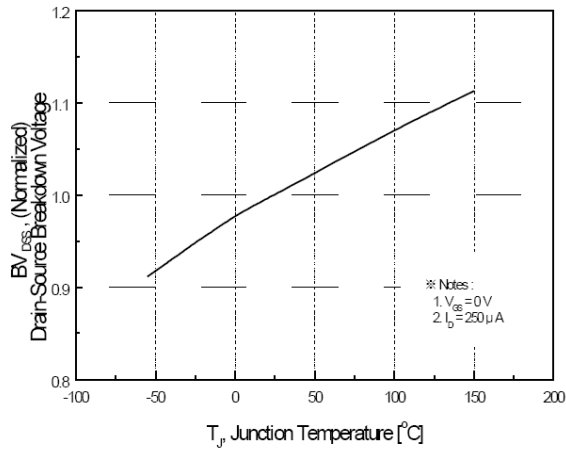


Figure 7. Breakdown Voltage Variation vs Temperature

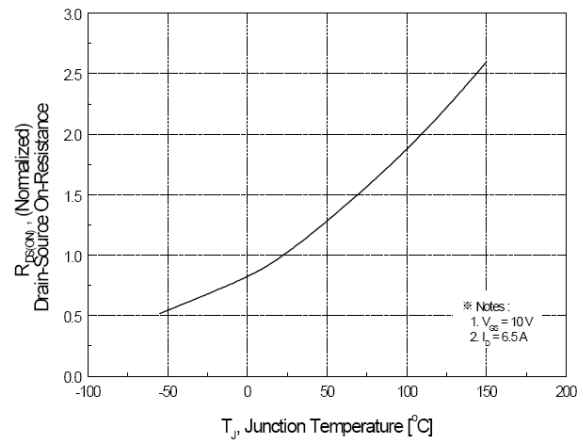


Figure 8. On-Resistance Variation vs Temperature

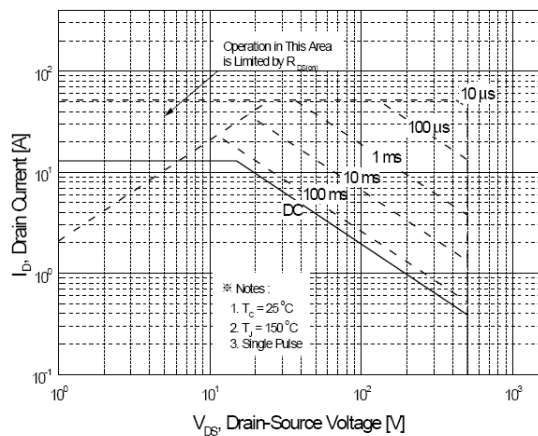


Figure 9. Maximum Safe Operating Area

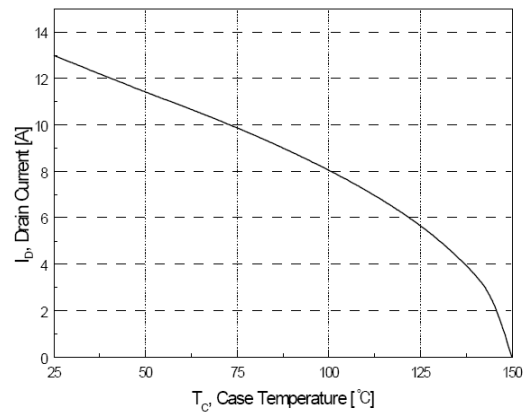


Figure 10. Maximum Drain Current vs Case Temperature

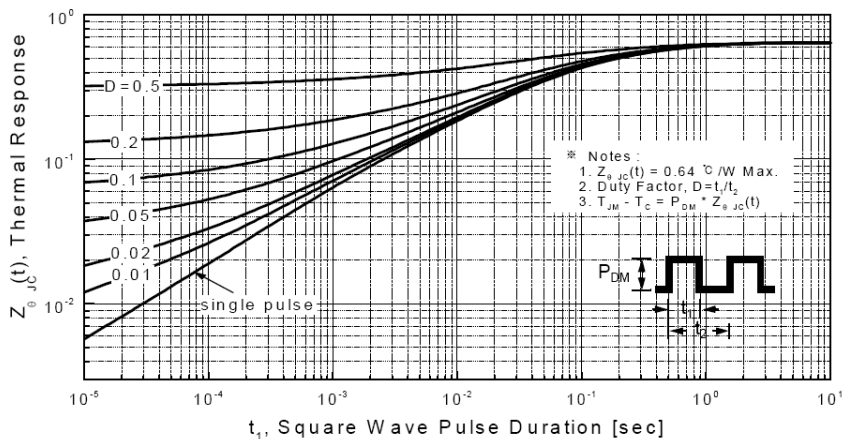


Figure 11. Transient Thermal Response Curve



Typical Characteristics

Fig 12. Gate Charge Test Circuit & Waveform

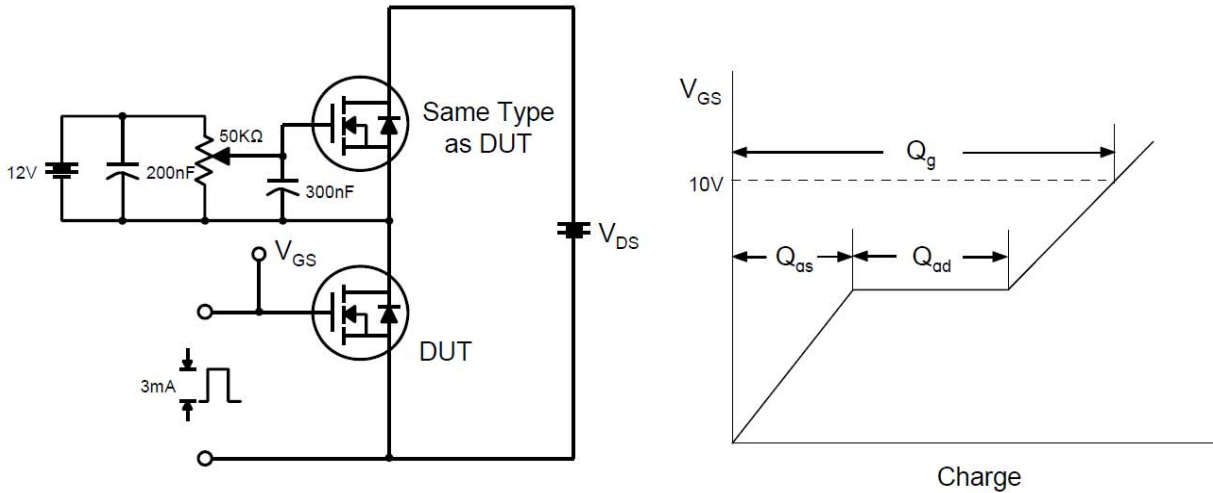


Fig 13. Resistive Switching Test Circuit & Waveforms

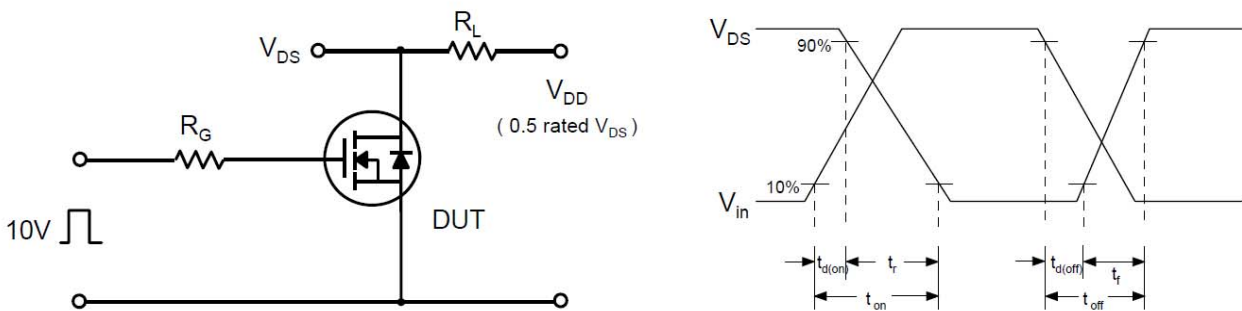
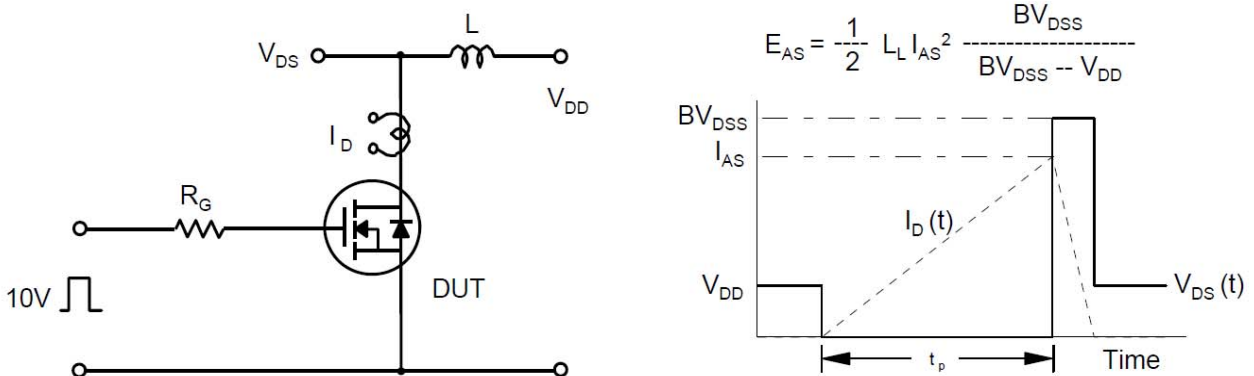


Fig 14. Unclamped Inductive Switching Test Circuit & Waveforms





Typical Characteristics

Fig 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

