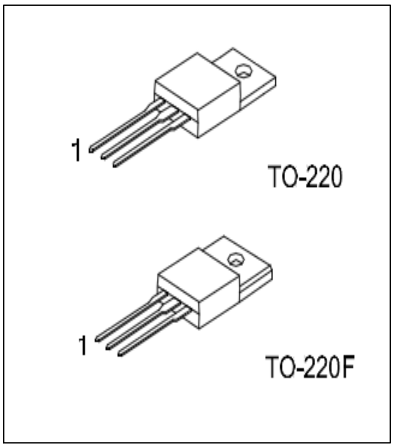
5 Amps，500Volts
N-Channel MOSFET

■ Description

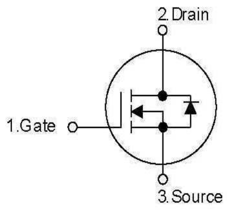
The ET830 N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ Features

- $R_{DS(ON)}$ = 1.5Ω@V_{GS} = 10 V
- Low gate charge (typical 20nC)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability



■ Symbol



■ Absolute Maximum Ratings(T_c=25℃,unless otherwise specified)

Parameter		Symbol	Ratings		Units
			TO-220	TO-220F	
Drain-Source Voltage		V_{DSS}	500		V
Gate-Source Voltage		V_{GSS}	±30		V
Drain Currenet Continuous	T_c=25℃	I_D	5.0	5.0*	A
	T_c=100℃		3.0	3.0*	A
Drain Current Pulsed (Note 1)		I_{DP}	20	20*	A
Avalanche Energy	Repetitive (Note 1)	E_{AR}	7.6		mJ
	Single Pulse (Note 2)	E_{AS}	305		mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5		V/ns
Total Power Dissipation	T_c=25℃	P_D	76	40	W
	Derate above 25℃		0.6	0.32	W/℃
Junction Temperature		T_J	+150		℃
Storage Temperature		T_{STG}	-55~+150		℃

*Drain current limited by maximum junction temperature.

■ Thermal Characteristics

Parameter	Symbol	Ratings		Units
		TO-220	TO-220F	
Thermal Resistance Junction-Ambient	R_{thJA}	62.5		℃/W
Thermal Resistance, Case-to-Sink Typ.	R_{thCS}	0.5	--	
Thermal Resistance Junction-Case	R_{thJC}	1.2	3.65	

■ Electrical Characteristics （T_J=25℃,unless Otherwise specified.）

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=250μA	500	--	--	V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS}=500V,V_{GS}=0V	--	--	1	μA
			V_{DS}=400V,T_C=125℃	--	--	10	μA
Gate-Body Leakage Current	Forward	I_{GSS}	V_{GS}=30V,V_{DS}=0V	--	--	100	nA
	Reverse		V_{GS}=-30V,V_{DS}=0V	--	--	-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D=250μA	--	0.6	--	V/℃
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0	--	4.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{DS}=10V,I_D=2.5A	--	1.10	1.5	Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=25V,V_{GS}=0V, f=1MH$_Z$	--	520	--	pF
Output Capacitance		C_{OSS}		--	80	--	pF
Reverse Transfer Capacitance		C_{RSS}		--	15	--	pF
Switching Characteristics							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=250V,I_D=5.0A, R_G=25Ω (Note 4, 5)	--	10	--	ns
Rise Time		t_R		--	50	--	ns
Turn-Off Delay Time		$t_{D(OFF)}$		--	50	--	ns
Fall Time		t_F		--	50	--	ns
Total Gate Charge		Q_G	V_{DS}=400V, I_D=5.0A, V_{GS}=10V (Note 4, 5)	--	20	--	nC
Gate-Source Charge		Q_{GS}		--	2.5	--	nC
Gate-Drain Charge		Q_{GD}		--	10	--	nC
Drain-Source Diode Characteristics							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V,I_{SD}=5.0A	--	--	1.4	V
Continuous Drain-Source Current		I_{SD}		--	--	5.0	A
Pulsed Drain-Source Current		I_{SM}		--	--	20.0	A
Reverse Recovery Time		t_{RR}	I_{SD}=5.0A, dI_{SD}/dt=100A/μs (Note 4)	--	260	--	ns
Reverse Recovery Charge		Q_{RR}		--	2.0	--	μC

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 22 mH, I_{AS} = 5.0 A, V_{DD} = 50V, R_G = 25 Ω, Starting TJ = 25°C
3. I_{SD} ≤ 5.0 A, di/dt ≤ 200A/μs, V_{DD}≤BV_{DSS}, Starting TJ = 25°C
4. Pulse Test : Pulse width ≤300μs, Duty cycle≤ 2%
5. Essentially independent of operating temperature

■ Typical Characteristics

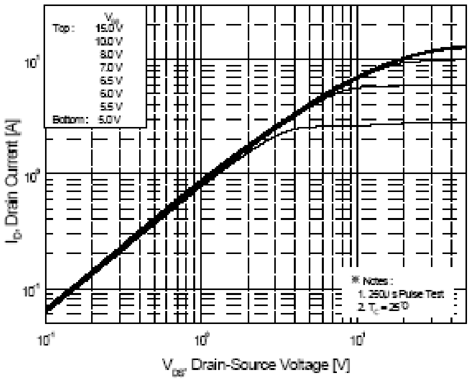


Figure 1. On-Region Characteristics

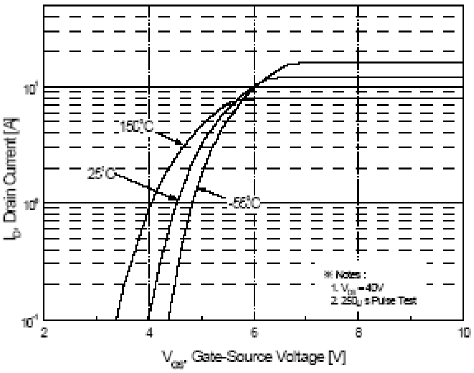


Figure 2. Transfer Characteristics

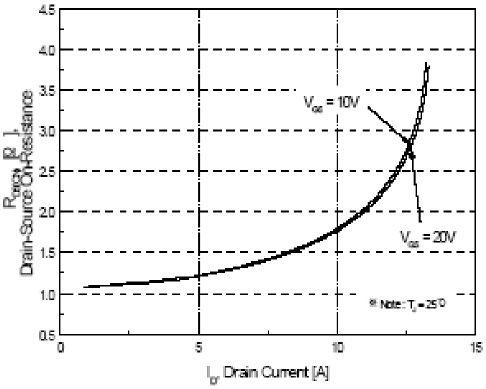


Figure 3. On-Resistance Variation vs
Drain Current and Gate Voltage

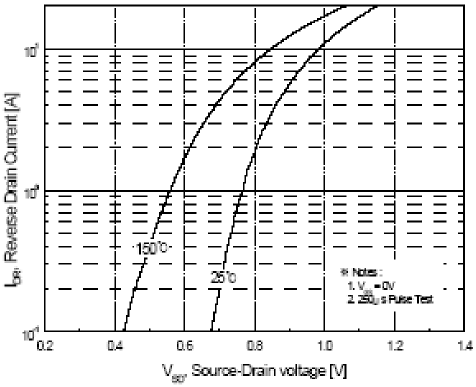


Figure 4. Body Diode Forward Voltage
Variation with Source Current
and Temperature

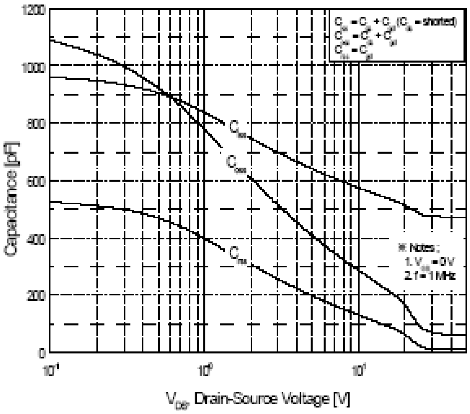


Figure 5. Capacitance Characteristics

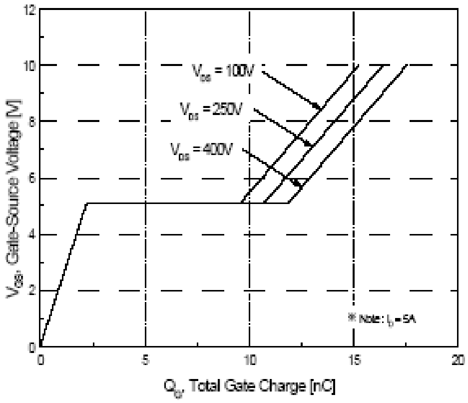


Figure 6. Gate Charge Characteristics

■ Typical Characteristics (Continued)

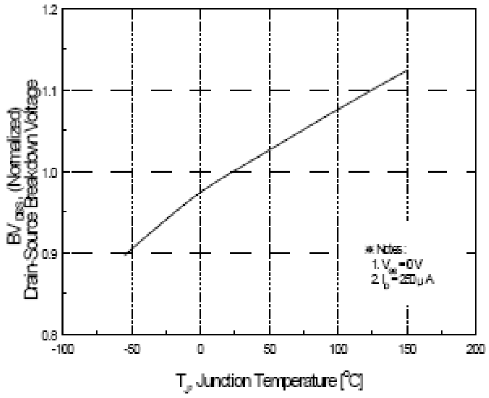


Figure 7. Breakdown Voltage Variation vs Temperature

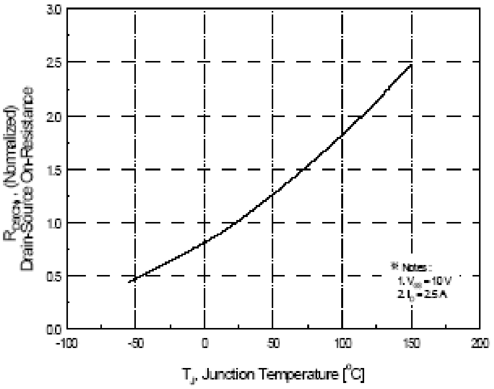


Figure 8. On-Resistance Variation vs Temperature

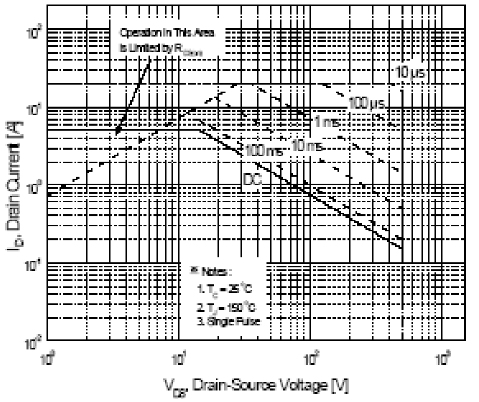


Figure 9-1. Maximum Safe Operating Area for TO220

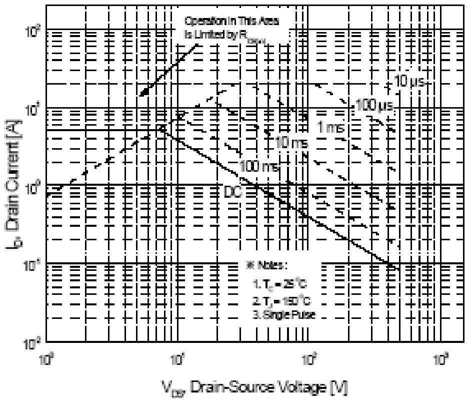


Figure 9-2. Maximum Safe Operating Area for TO220F

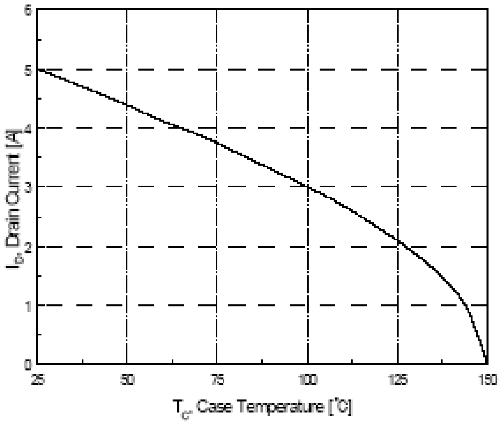


Figure 10. Maximum Drain Current vs Case Temperature

Typical Characteristics (Continued)

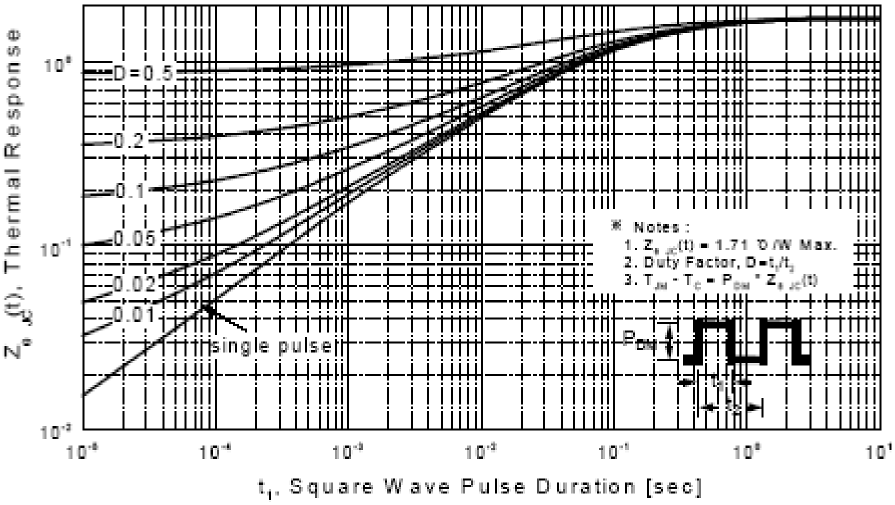


Figure 11-1. Transient Thermal Response Curve for TO220

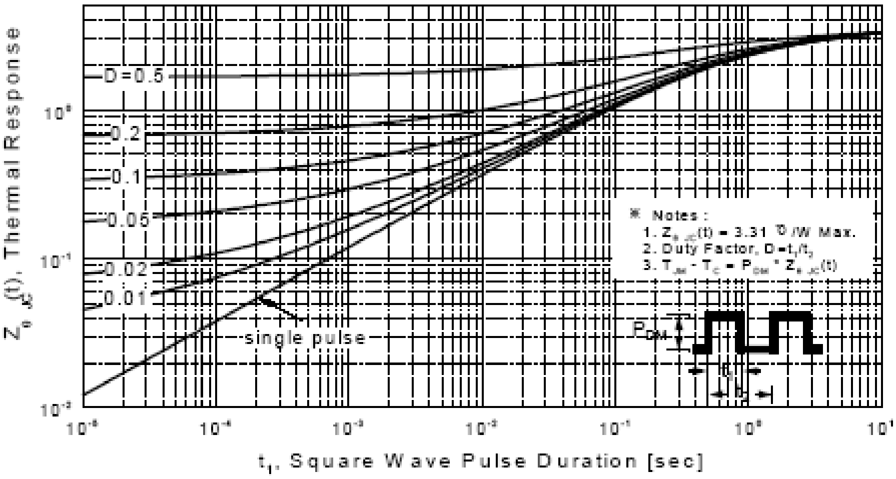


Figure 11-2. Transient Thermal Response Curve for TO220F