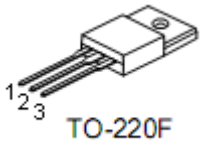
1. Description

This high voltage MOSFET uses an advanced termination scheme to provide enhanced voltage-blocking capability without degrading performance over time. In addition, this advanced MOSFET is designed to withstand high energy in avalanche and commutation modes. The new energy efficient design also offers a drain-tosource diode with a fast recovery time. Designed for high voltage, high speed switching applications in power supplies, converters and PWM motor controls, these devices are particularly well suited for bridge circuits where diode speed and commutating safe operating areas are critical and offer additional and safety margin against unexpected voltage transients.

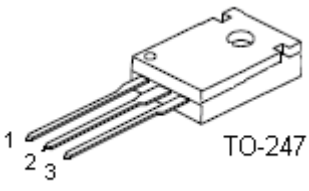
2. Features

- Robust high voltage termination
- Avalanche energy specified
- Source-to-drain diode recovery time comparable to a discrete fast recovery diode
- Diode is characterized for use in bridge circuits
- I_{DSS} and $V_{DS(ON)}$ specified at elevated temperature
- Isolated mounting hole reduces mounting hardware

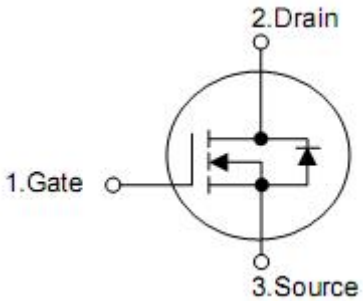
3.Symbol



TO-220F



TO-247



Pin	Function
1	Gate
2	Drain
3	Source

4. Absolute maximum ratings

(T_A=25°C,unless otherwise noted)

Parameter		Symbol	Rating		Units
			TO-220F	TO-247	
Gate-to-source voltage continue		V_{GS}	±20		V
Junction and storage temperature range		T_J, T_{STG}	-55 to150		ºC
Drain to current	continuous	I_D[1]	47		A
	pulsed	I_{DM}	141		A
Single pulsed drain-to-source avalanche energy T_J=25 ºC[2]		E_{AS}	720		mJ
Total power dissipation		P_D	50	417	W
	Derate above 25 ºC		0.4	2.78	W/ ºC
Maximum lead temperature for soldering purposes, 1/8`` from case for 10secods		T_L	260		ºC

5. Thermal characteristics

Parameter	Symbol	Rating	Unit
Thermal resistance,Junction-ambient	$R_{\theta JA}$	40	ºC/W
Thermal resistance,Junction-case	$R_{\theta JC}$	0.3	ºC/W

1.Drain current limited by maximum junction temperature.
2.Eas:V_{DD}=100V, V_{GS}=10V, I_L=12A, L=10mH,R_G=25Ω

6. Electrical characteristics

(T_J=25°C,unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V,I_{DS}=250μA	600	-	-	V
Drain-source leakage current	I_{DSS}	V_{DS}=600V, V_{GS}=0V	-	-	1	μA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	2.0	3.0	4.0	V
Gate-source leakage current-forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V	-	-	100	nA
Gate-source leakage current-reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V	-	-	-100	nA
Static drain-source on-resistance	$R_{DS(on)}$*	V_{GS}=10V,I_D=15.6A	-	68	81	mΩ
Forward on-volage(1)	V_{SD}*	I_S=20A d_{IS}/d_t=100A/us	-	-	1.5	V
Reverse recovery time	t_{rr}		-	450	-	nS
Forward turn-on time	t_{on}		-	**	-	nC
Input capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V, f=1MHz	-	3111.9	-	pF
Output capacitance	C_{oss}		-	2399.1	-	
Reverse transfer capacitance	C_{rss}		-	61.6	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=300V,I_D=20A R_G=25Ω*	-	45.5	-	ns
Rise time	t_r		-	120.56	-	
Turn-off delay time	$t_{d(off)}$		-	137.06	-	
Fall time	t_f		-	116.2	-	
Total gate charge	Q_g	V_{DS}=480V, I_D=20A V_{GS}=10V*	-	87.967	-	nC
Gate-source charge	Q_{gs}		-	21.758	--	
Gate-drain charge	Q_{gd}		-	41.14	--	

Note *:Pulse test;pulse width≤300us duty cycle≤2%.

**:Negligible,dominated by circuit inductance.

7. Test circuits and waveforms

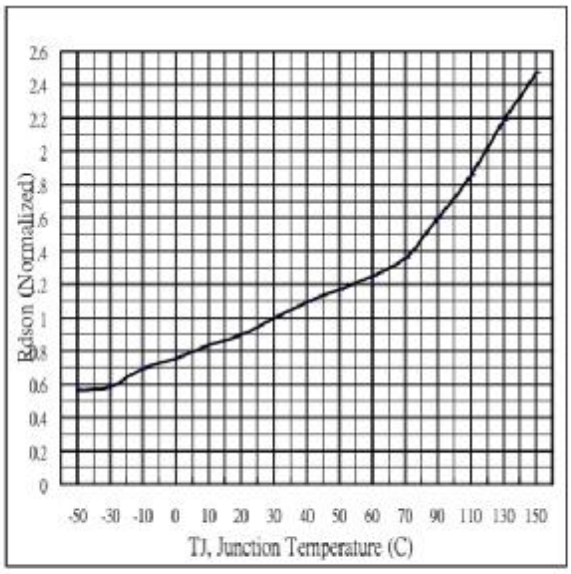


Fig 1. On-Resistance Variation with vs. Temperature

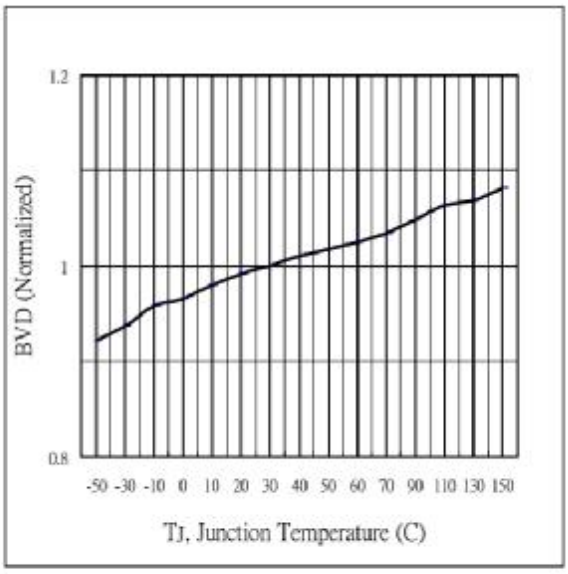


Fig.2 Breakdown Voltage Variation vs. Temperature

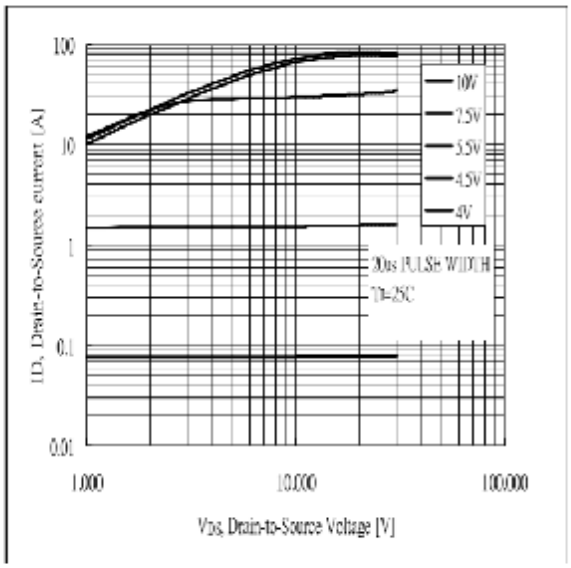


Fig 3. Typical Output Characteristics

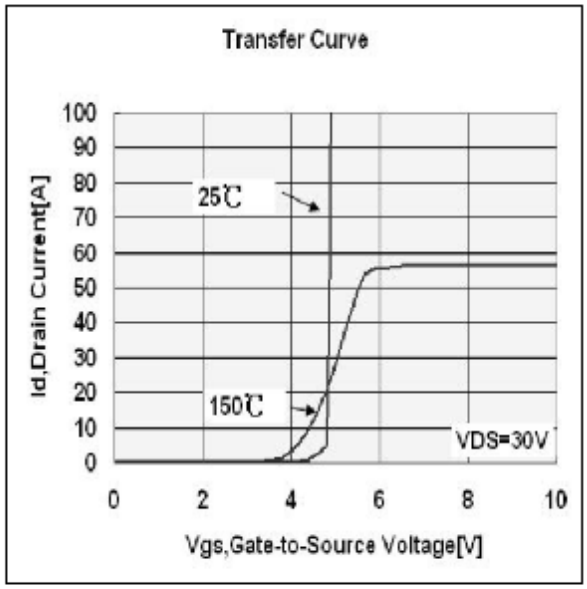


Fig 4. Typical Transfer Characteristics

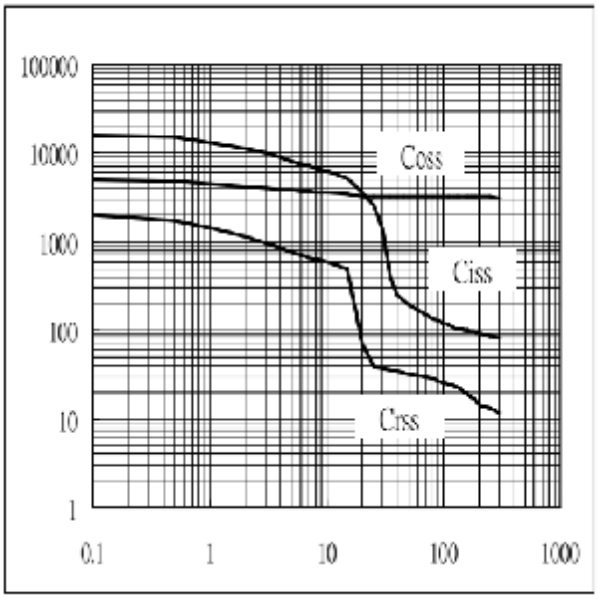


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

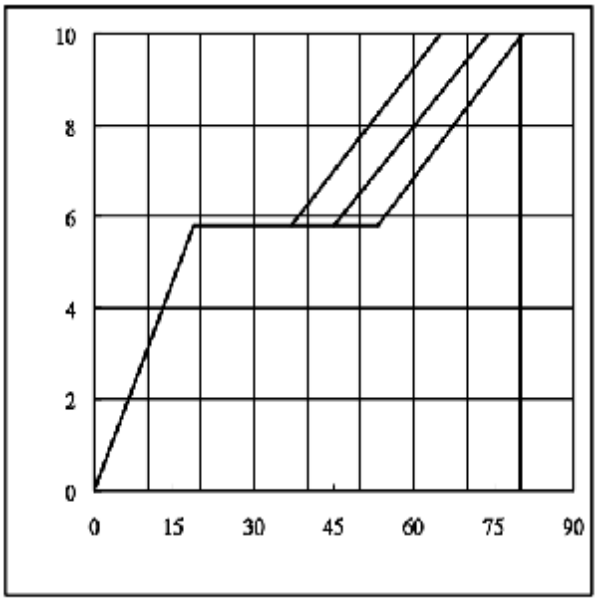


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage