

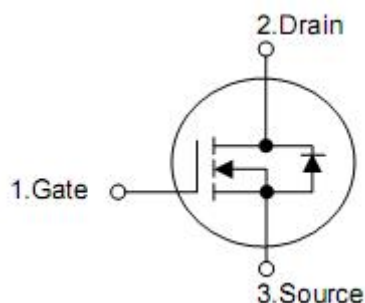
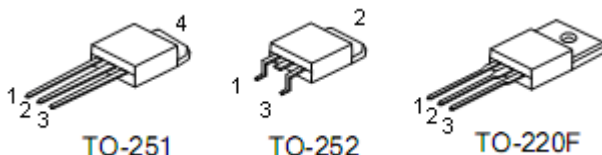
1. Description

This Power MOSFET is produced using Maple semi's advanced planar stripe DMOS technology. 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 switched mode power supplies, active power factor correction based on half bridge topology.

2. Features

- n $R_{DS(on) typ} = 1.8\Omega @ V_{GS} = 10V$
- n Low gate charge (typical 16nC)
- n High ruggedness
- n Fast switching
- n 100% avalanche tested
- n Improved dv/dt capability

3. Pin configuration



Pin	Function
1	Gate
2	Drain
3	Source
4	Drain

4. Absolute maximum ratings

(T_C=25°C , unless otherwise noted)

Parameter	Symbol	Rating		Units
		To251	To252	
Drain-source voltage	V _{DSS}	700		V
Drain current continuous	I _D	T _C =25°C		5.8*
		T _C =100°C		3.0*
Drain current pulsed (note1)	I _{DM}	20*		A
Gate-source voltage	V _{GSS}	±30		V
Single Pulse avalanche energy (note2)	E _{AS}	150		mJ
Avalanche current (note1)	I _{AR}	4.8		A
Repetitive avalanche energy (note1)	E _{AR}	9.5		mJ
Peak diode recovery dv/dt (note3)	dv/dt	4.5		V/ns
Power dissipation	P _D	T _C =25°C		95
		Derate above 25°C		0.76
Operating and storage temperature range	T _J , T _{STG}	-55~+150		°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T _L	300		°C

* Drain current limited by maximum junction temperature.

5. Thermal characteristics

Parameter	Symbol	Rating		Unit
		To251/To252	TO220F	
Thermal resistance junction-case	R _{thJC}	1.3	2.6	°C/W
Thermal resistance, case-to-sink typ.	R _{thJS}	50	--	
Thermal resistance junction-ambient	R _{thJA}	110	62.5	

6. Electrical characteristics

($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Units
Off characteristics							
Drain-source breakdown voltage		BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	700	-	-	V
Breakdown voltage temperature coefficient		$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, Referenced to 25°C	-	0.7	-	V/ $^{\circ}\text{C}$
Zero gate voltage drain current		I_{DSS}	$V_{DS}=700V, V_{GS}=0V$	-	-	1	μA
			$V_{DS}=560V, T_C=125^{\circ}\text{C}$	-	-	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
On characteristics							
Gate threshold voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	-	4.0	V
Static drain-source on-resistance		$R_{DS(ON)}$	$V_{GS}=10V, I_D=2.4A$	-	1.8	2.3	Ω
Dynamic characteristics							
Input capacitance		C_{ISS}	$V_{DS}=25V, V_{GS}=0V$, $f=1\text{MHz}$	-	650	-	pF
Output capacitance		C_{OSS}		-	95	-	pF
Reverse transfer capacitance		C_{RSS}		-	10	-	pF
Switching characteristics							
Turn-on delay time		$t_{D(ON)}$	$V_{DD}=350V, R_G=25\Omega$, $I_D=6.0A$ (note 4,5)	-	30	-	ns
Rise time		t_R		-	40	-	ns
Turn-off delay time		$t_{D(OFF)}$		-	80	-	ns
Fall time		t_F		-	40	-	ns
Total gate charge		Q_G	$V_{DS}=560V, V_{GS}=10V$, $I_D=6.0A$ (note 4,5)	-	16	-	nC
Gate-source charge		Q_{GS}		-	4.5	-	nC
Gate-drain charge		Q_{GD}		-	5.0	-	nC
Drain-source diode characteristics							
Continuous drain-source current		I_S		-	-	4.8	A
Pulsed drain-source current		I_{SM}		-	-	20	A
Drain-source diode forward voltage		V_{SD}	$V_{GS}=0V, I_S=4.8A$	-	-	1.4	V
Reverse recovery time		t_{RR}	$V_{GS}=0V, I_S=6.0A$, $di_F/dt=100A/\mu s$ (note 4)	-	280	-	ns
Reverse recovery charge		Q_{RR}		-	2.0	-	μC

Note: 1. Repetitive rating: pulse width limited by maximum junction temperature

2. $L=8\text{mH}$, $I_{AS}=6.0A$, $V_{DD}=50V$, $R_G=25\Omega$, starting $T_J=25^{\circ}\text{C}$

3. $I_{SD}\leq 4.8A$, $di/dt \leq 200A/\mu s$, $V_{DD}\leq BV_{DSS}$, starting $T_J=25^{\circ}\text{C}$

4. Pulse test: pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

5. Essentially independent of operating temperature

7. Test circuits and waveforms

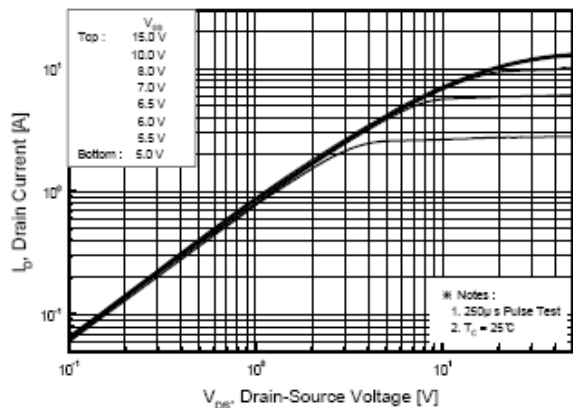


Figure 1. On-Region Characteristics

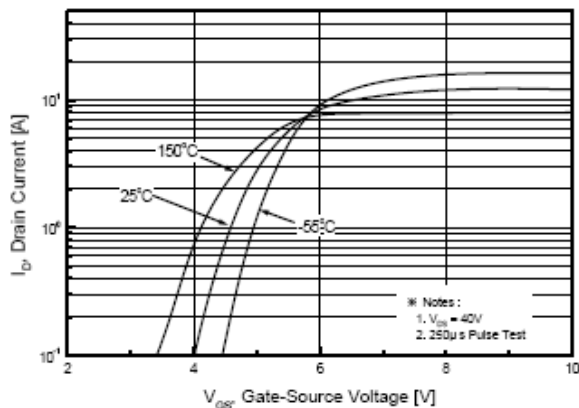


Figure 2. Transfer Characteristics

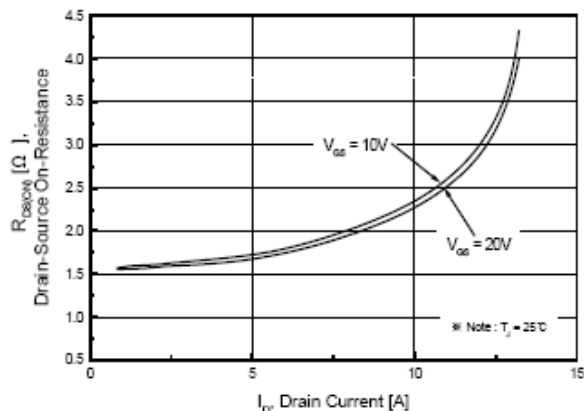


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

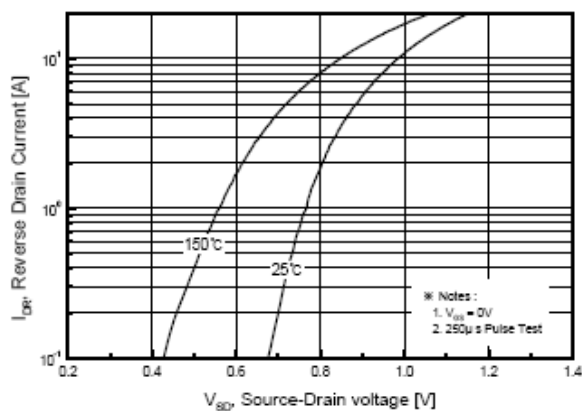


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

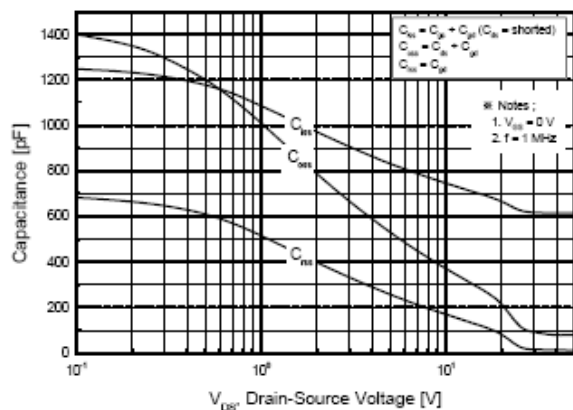


Figure 5. Capacitance Characteristics

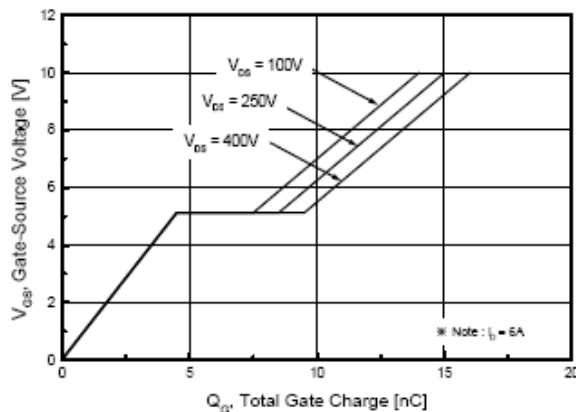


Figure 6. Gate Charge Characteristics

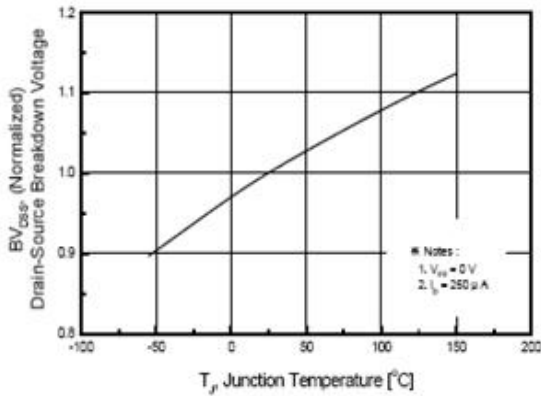


Figure 7. Breakdown Voltage Variation vs Temperature

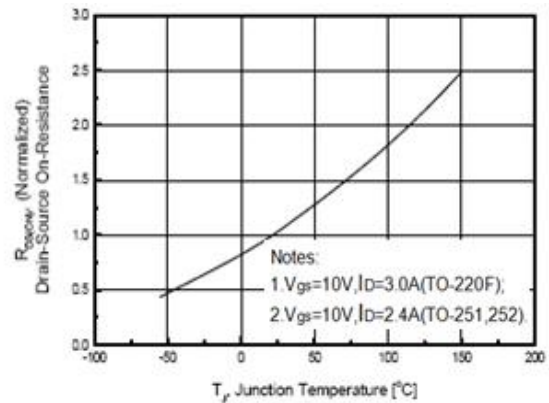


Figure 8. On-Resistance Variation vs Temperature

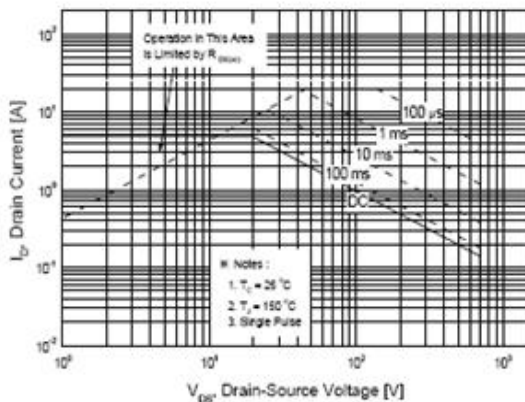


Figure 9. Maximum Safe Operating Area

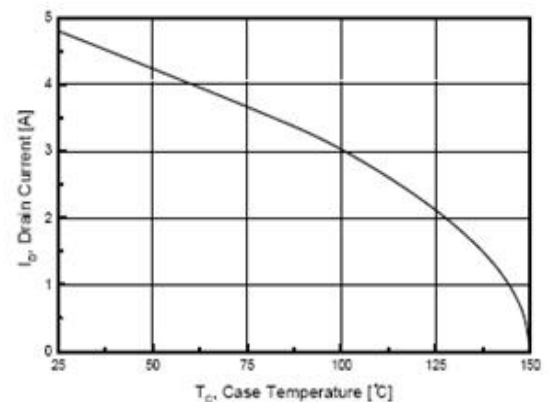


Figure 10. Maximum Drain Current vs Case Temperature

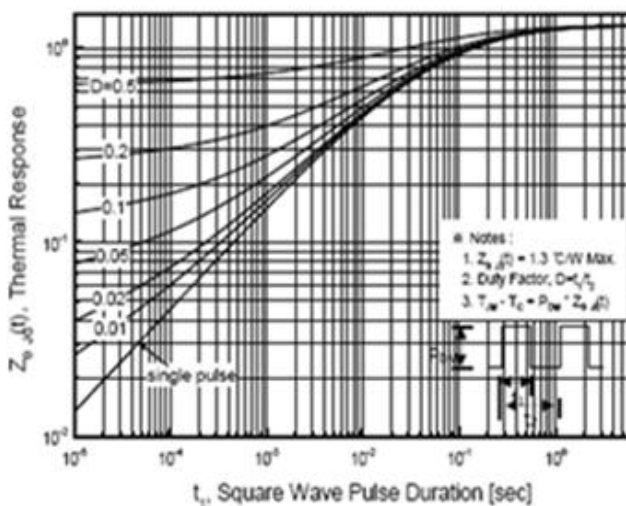


Figure 11-1. Transient Thermal Response Curve for (TO-251, 252)

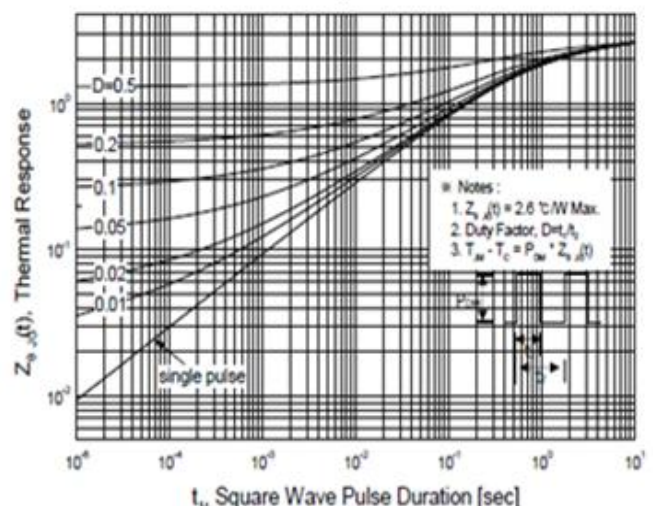


Figure 11-2. Transient Thermal Response Curve for (TO-220F)