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November 2013

FCH22N60N

N-Channel SupreMOS[®] MOSFET 600 V, 22 A, 165 m Ω

Features

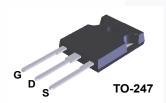
- 650 V @ T_J = 150°C
- $R_{DS(on)}$ = 140 $m\Omega$ (Typ.) @ V_{GS} = 10 V, I_D = 11 A
- Ultra Low Gate Charge (Typ. Q_q = 45 nC)
- Low Effective Output Capacitance (Typ. Coss(eff.) = 196.4 pF)
- · 100% Avalanche Tested
- · RoHS Compliant

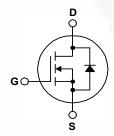
Application

- PDP TV
- · Solar Inverter
- · AC-DC Power Supply

Description

The SupreMOS® MOSFET is Fairchild Semiconductor's next generation of high voltage super-junction (SJ) technology employing a deep trench filling process that differentiates it from the conventional SJ MOSFETs. This advanced technology and precise process control provides lowest Rsp on-resistance, superior switching performance and ruggedness. SupreMOS MOSFET is suitable for high frequency switching power converter applications such as PFC, server/telecom power, FPD TV power, ATX power, and industrial power applications.





Absolute Maximum Ratings T_C = 25°C unless otherwise noted.

Symbol		Parameter		FCH22N60N	Unit	
V _{DSS}	Drain to Source Voltage			600	V	
V _{GSS}	Gate to Source Voltage			±30	V	
	Drain Current	- Continuous (T _C = 25°C)		22	_	
ID	Drain Current	- Continuous (T _C = 100°C)		13.8	Α	
I _{DM}	Drain Current	- Pulsed (N	Note 1)	66	Α	
E _{AS}	Single Pulsed Avalanche I	Energy (N	Note 2)	672	mJ	
I _{AR}	Avalanche Current	1)	Note 1)	7.3	Α	
E _{AR}	Repetitive Avalanche Ene	rgy (N	Note 1)	2.75	mJ	
dv/dt	MOSFET dv/dt			100	V/ns	
uv/ul	Peak Diode Recovery dv/d	it (1	Note 3)	20	V/IIS	
n	Dawer Dissination	$(T_C = 25^{\circ}C)$		205	W	
P _D Power Dissipation	Power Dissipation	- Derate Above 25°C		1.64	W/°C	
T _J , T _{STG}	Operating and Storage Te	mperature Range		-55 to +150	°C	
TL	Maximum Lead Temperatu	ure for Soldering, 1/8" from Case for 5 Secon	ds	300	°C	

Thermal Characteristics

Symbol	Parameter	FCH22N60N	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case, Max.	0.61	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient, Max. 40		- 6/00

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FCH22N60N	FCH22N60N	TO-247	Tube	N/A	N/A	30 units

Test Conditions

Min.

Typ.

Max.

Unit

Electrical Characteristics $T_C = 25^{\circ}C$ unless otherwise noted. Parameter

Off Chara	acteristics					
D\/	BV _{DSS} Drain to Source Breakdown Voltage	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}, T_J = 25^{\circ}\text{C}$	600	-	-	V
BV _{DSS} Drain to Source Breakdown Voltage	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}, T_J = 150^{\circ}\text{C}$	650	-	-	, v	
ΔBV _{DSS} / ΔT _J	Breakdown Voltage Temperature Coefficient	I _D = 1 mA, Referenced to 25°C	-	0.68	-	V/°C
1	Zero Gate Voltage Drain Current	V _{DS} = 480 V, V _{GS} = 0 V	-	-	10	μА
DSS	Zero Gate Voltage Drain Current	$V_{DS} = 480 \text{ V}, T_{J} = 125^{\circ}\text{C}$	-	-	100	μΑ
I _{GSS}	Gate to Body Leakage Current	V _{GS} = ±50 V, V _{DS} = 0 V	-	-	±100	nA

On Characteristics

Symbol

V _{GS(th)}	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250 \mu\text{A}$	2.0	3	4.0	V
R _{DS(on)}	Static Drain to Source On Resistance	V _{GS} = 10 V, I _D = 11 A	-	0.140	0.165	Ω
9 _{FS}	Forward Transconductance	V _{DS} = 20 V, I _D = 11 A	-	22	-	S

Dynamic Characteristics

C _{iss}	Input Capacitance	V = 400 V V = 0 V	-	1950	-	pF
Coss	Output Capacitance	V _{DS} = 100 V, V _{GS} = 0 V f = 1 MHz		75.9	-	pF
C _{rss}	Reverse Transfer Capacitance	1 = 1 1/11/12	- \	3	-	pF
Coss	Output Capacitance	V _{DS} = 380 V, V _{GS} = 0 V, f = 1 MHz	- \	43.2	-	pF
C _{oss(eff.)}	Effective Output Capacitance	$V_{DS} = 0 \text{ V to } 480 \text{ V}, V_{GS} = 0 \text{ V}$	-	196.4	-	pF
Q _{g(tot)}	Total Gate Charge at 10V	V _{DS} = 380 V, I _D = 11 A,	-	45	-	nC
Q_{gs}	Gate to Source Gate Charge	V _{GS} = 10 V	-	8.7	-	nC
Q_{gd}	Gate to Drain "Miller" Charge	(Note 4)	-	14.5	-	nC
ESR	Equivalent Series Resistance (G-S)	f = 1 MHz	-	1	-	Ω

Switching Characteristics

t _{d(on)}	Turn-On Delay Time		-	16.9	-	ns
t _r	Turn-On Rise Time	$V_{DD} = 380 \text{ V}, I_D = 11 \text{ A}$	-	16.7	-	ns
t _{d(off)}	Turn-Off Delay Time	$R_G = 4.7 \Omega$	-	49	-	ns
t _f	Turn-Off Fall Time	(Note 4)	-	4	-	ns

Drain-Source Diode Characteristics

I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	22	Α
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	66	Α
V_{SD}	Drain to Source Diode Forward Voltage	V _{GS} = 0 V, I _{SD} = 11 A	-	-	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _{SD} = 11 A	-	350	// -	ns
Q _{rr}	Reverse Recovery Charge	$dI_F/dt = 100 A/\mu s$	-	6	-	μС

- **Notes:**1. Repetitive rating: pulse-width limited by maximum junction temperature.
- 2. $\rm I_{AS}$ = 7.3 A, $\rm R_{G}$ = 25 Ω , starting $\rm T_{J}$ = 25°C.
- 3. $I_{SD} \le 22$ A, di/dt ≤ 200 A/ μ s, $V_{DD} \le 380$ V, starting T_J = 25°C.
- 4. Essentially independent of operating temperature typical characteristics.

Typical Performance Characteristics

Figure 1. On-Region Characteristics

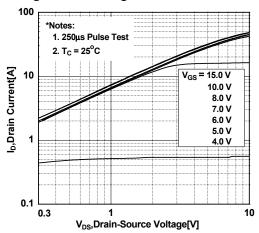


Figure 3. On-Resistance Variation vs.

Drain Current and Gate Voltage

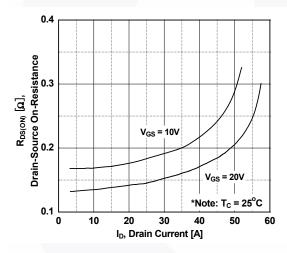


Figure 5. Capacitance Characteristics

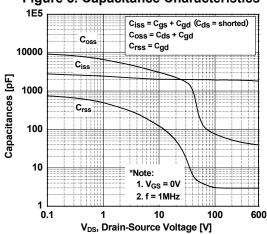


Figure 2. Transfer Characteristics

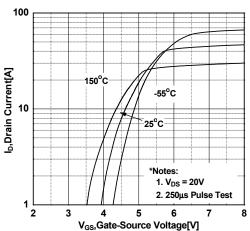


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

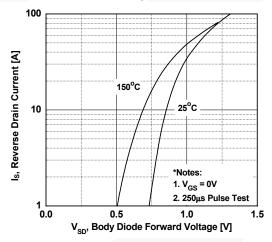
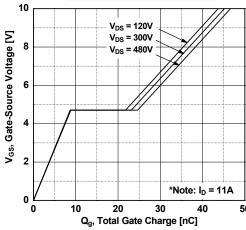


Figure 6. Gate Charge Characteristics



Typical Performance Characteristics (Continued)

Figure 7. Breakdown Voltage Variation vs. Temperature

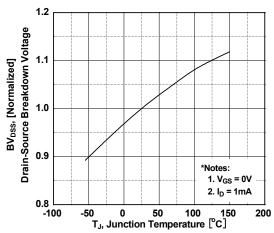


Figure 9. Maximum Safe Operating Area

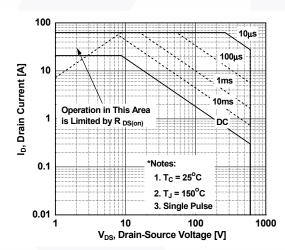


Figure 8. On-Resistance Variation vs. Temperature

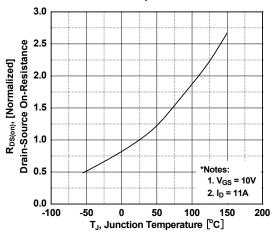


Figure 10. Maximum Drain Current vs. Case Temperature

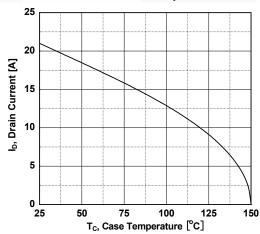
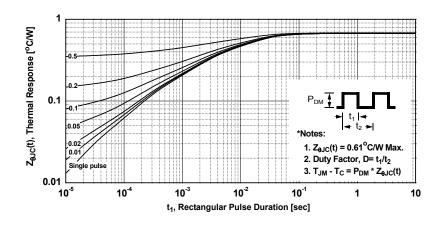


Figure 11. Transient Thermal Response Curve



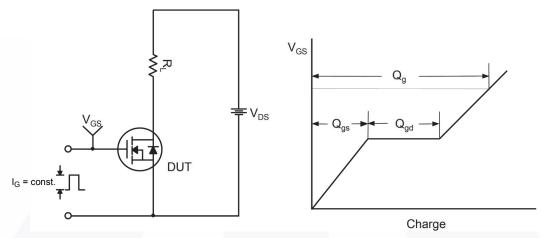


Figure 12. Gate Charge Test Circuit & Waveform

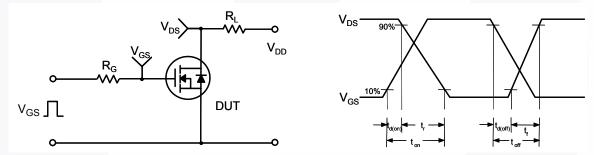


Figure 13. Resistive Switching Test Circuit & Waveforms

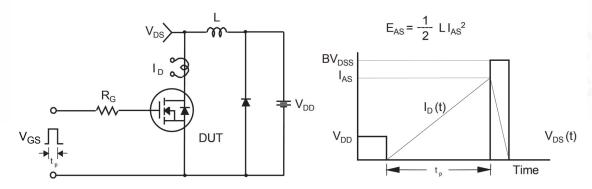


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

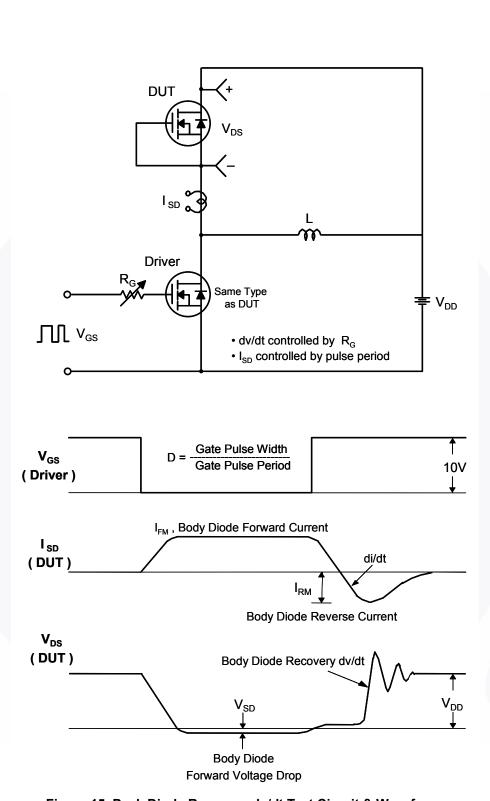
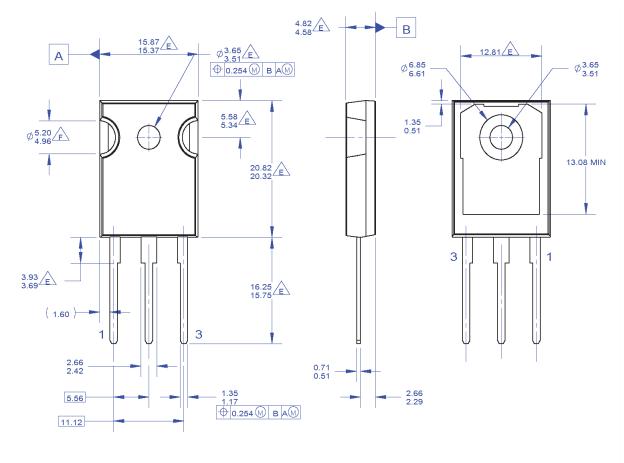


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

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G. DRAWING FILENAME: MKT-TO247A03_REV03

Figure 16. TO-247, Molded, 3-Lead, Jedec Variation AB

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