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### FCP9N60N / FCPF9N60NT N-Channel SupreMOS<sup>®</sup> MOSFET

#### 600 V, 9 A, 385 mΩ

#### **Features**

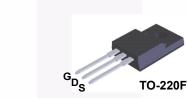
- R<sub>DS(on)</sub> = 330 mΩ (Typ.) @ V<sub>GS</sub> = 10 V, I<sub>D</sub> = 4.5 A
- Ultra Low Gate Charge (Typ. Q<sub>q</sub> = 22 nC)
- Low Effective Output Capacitance (Typ. Coss(eff.) = 106 pF)
- 100% Avalanche Tested
- · RoHS Compliant

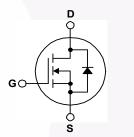
#### Application

- LCD/LED/PDP TV
- Lighting
- · 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<sub>C</sub> = 25°C unless otherwise noted.

TO-220

Symbol			Parameter		FCP9N60N	FCPF9N60NT	Unit	
V <sub>DSS</sub>	Drain to Source Voltage				6	V		
V <sub>GSS</sub>	Gate to Sou	urce Voltage			±	V		
	Drain Curra	t	- Continuous (T <sub>C</sub> = 25 <sup>o</sup> C)	- Continuous (T <sub>C</sub> = 25 <sup>o</sup> C)		9.0*	^	
I <sub>D</sub>	Drain Curre	ent	- Continuous ( $T_C = 100^{\circ}C$ )		5.7	5.7*	A	
I <sub>DM</sub>	Drain Curre	ent	- Pulsed	- Pulsed (Note 1)		27*	А	
E <sub>AS</sub>	Single Pulsed Avalanche Energy (Note 2)				135		mJ	
I <sub>AR</sub>	Avalanche Current			(Note 1)	3		А	
E <sub>AR</sub>	Repetitive Avalanche Energy			(Note 1)	0	.83	mJ	
dv/dt	MOSFET dv/dt				100		V/ns	
uv/ut	Peak Diode Recovery dv/dt		it	(Note 3)	2	20	V/ns	
P <sub>D</sub>	Power Dissipation		(T <sub>C</sub> = 25 <sup>o</sup> C)		83.3	29.8	W	
	Power Diss	apation	- Derate Above 25°C	- Derate Above 25°C		0.24	W/ºC	
T <sub>J</sub> , T <sub>STG</sub>	Operating and Storage Temperature Range			-55 to +150		°C		
TL	Maximum Lead Temperature for Soldering, 1/8" from Case for 5 Seconds 300				00	°C		

Drain current limited by maximum junction temperature.

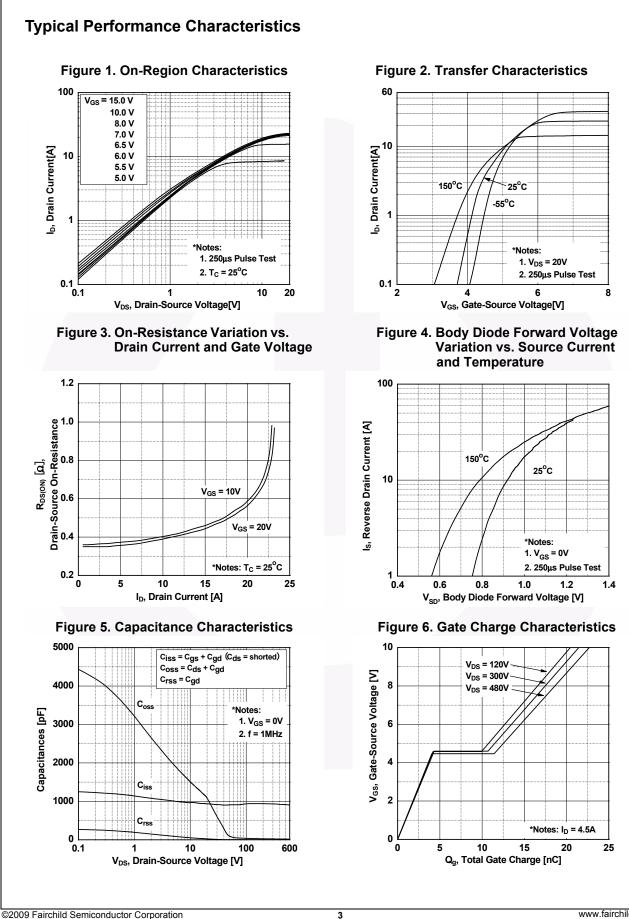
#### **Thermal Characteristics**

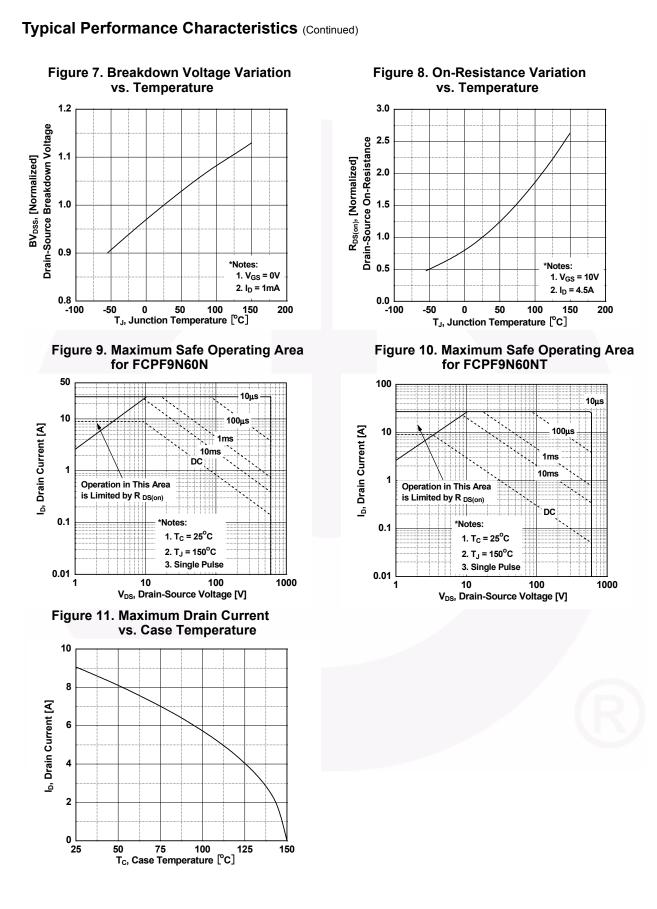
Symbol	Parameter	FCP9N60N	FCPF9N60NT	Unit
$R_{ extsf{ heta}JC}$	Thermal Resistance, Junction to Case, Max.	1.5	4.2	°C/W
$R_{ hetaJA}$	Thermal Resistance, Junction to Ambient, Max.	62.5	62.5	0/00

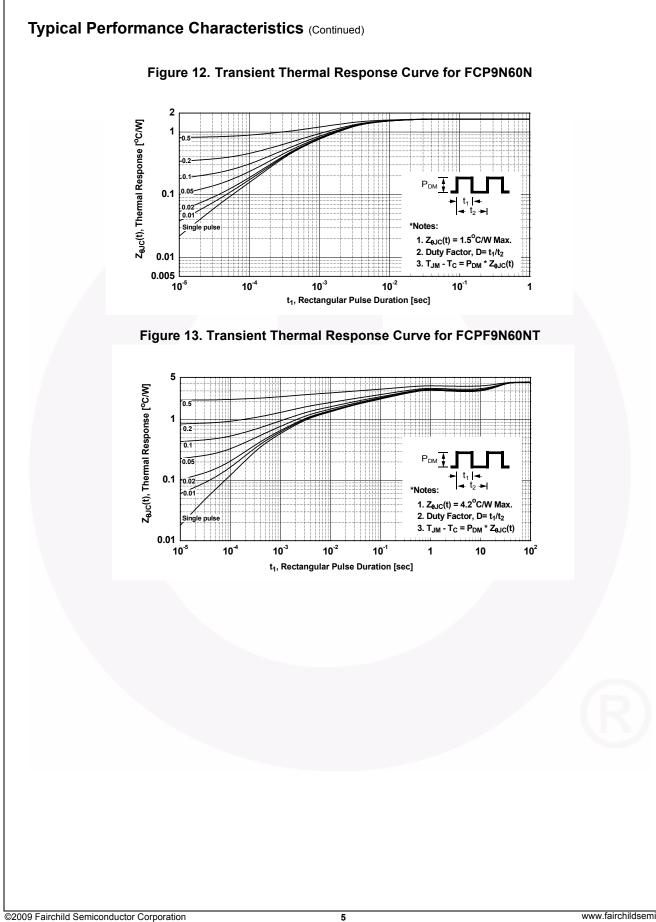
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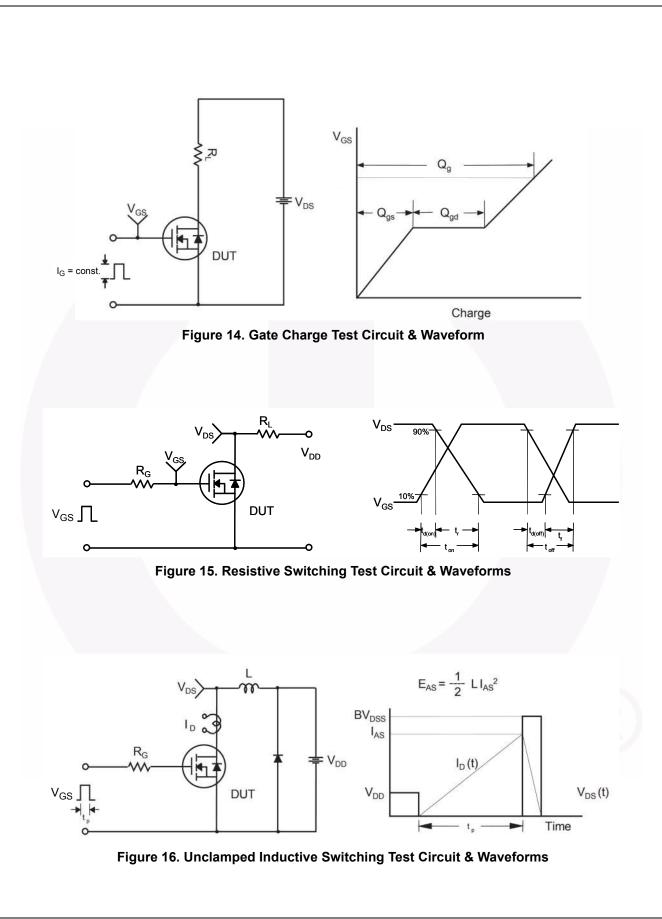
FCP9N60N FCP9N60N TO				age	Packing Method	Reel Size	Tape Width		Quantity	
			TO-2		Tube	N/A	N/A		50 units 50 units	
		TO-22		Tube	N/A		N/A			
	I Chara	acteristics $T_{c} = 2$	25°C unles	ss othe						
Symbol		Parameter			Test Condition	ns	Min.	Тур.	Max.	Unit
Off Charac	teristics	5								
3V <sub>DSS</sub>	Drain to	Source Breakdown Vol	tage	$I_D = 1 \text{ mA}, V_{GS} = 0 \text{ V}, T_C = 25^{\circ}\text{C}$			600	-	-	V
ΔBV <sub>DSS</sub> / ΔT <sub>J</sub>	Breakdo Coefficie	wn Voltage Temperatur ent	e	I <sub>D</sub>	$I_D = 1$ mA, Referenced to $25^{\circ}C$			0.72	-	V/ºC
<b> </b>	Zero Ga	Zero Gate Voltage Drain Current		VC	<sub>DS</sub> = 480 V, V <sub>GS</sub> = 0 V		-	-	10	μA
DSS	2610 08	te voltage Drain Currer		$V_{DS}$ = 480 V, $V_{GS}$ = 0 V, $T_{C}$ = 125°C			-	-	100	μΛ
GSS	Gate to	Body Leakage Current		Vc	<sub>SS</sub> = ±30 V, V <sub>DS</sub> = 0 V		-	-	±100	nA
On Charac	teristics	5								
V <sub>GS(th)</sub>	Gate Th	reshold Voltage	-	V	<sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250 μA		2.0	-	4.0	V
R <sub>DS(on)</sub>		ain to Source On Resis	stance		$V_{GS} = 10 \text{ V}, \text{ I}_{D} = 4.5 \text{ A}$			0.33	0.385	Ω
9FS	Forward	Transconductance		$V_{DS} = 40 \text{ V}, \text{ I}_{D} = 4.5 \text{ A}$			-	7.5	-	S
Dynamic C	haracte	ristics						L		
C <sub>iss</sub>		t Capacitance ut Capacitance erse Transfer Capacitance			— V <sub>DS</sub> = 100 V, V <sub>GS</sub> = 0 V, f = 1 MHz		<u> </u>	930	1240	pF
C <sub>oss</sub>							-	35	50	pF
Srss				t =			-	2	4	pF
C <sub>oss</sub>		Capacitance		V <sub>DS</sub> = 380 V, V <sub>GS</sub> = 0 V, f = 1 MHz			-	20	-	pF
C <sub>oss(eff.)</sub>	-	ive Output Capacitance			$V_{DS} = 0 V \text{ to } 480 V, V_{GS} = 0 V$			106	-	pF
Q <sub>g(tot)</sub>		ate Charge at 10V			V <sub>DS</sub> = 380 V, I <sub>D</sub> = 4.5 A,			22.0	29	nC
Q <sub>gs</sub>	Gate to			$V_{GS} = 10 V$			-	4.1	-	nC
Q <sub>gd</sub>	Gate to	Drain "Miller" Charge		(Note 4)			-	7.1	-	nC
EŠR	Equivale	nt Series Resistance (0	G-S)	f =	= 1 MHz			2.9		Ω
Switching	Charact	eristics								
t <sub>d(on)</sub>	-	Delay Time					-	12.7	35.4	ns
r		n-On Rise Time n-Off Delay Time		V	$V_{DD}$ = 380 V, I <sub>D</sub> = 4.5 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 4.7 Ω			8.7	27.4	ns
t <sub>d(off)</sub>								36.9	83.8	ns
t <sub>f</sub>	Turn-Off	Fall Time		(Note 4)			-	10.2	30.4	ns
		e Characteristics								
		n Continuous Drain to S		odo Ec	nward Current		-	-	9.0	A
S		n Pulsed Drain to Source					-	-	9.0 27	A
sм V <sub>SD</sub>		Source Diode Forward		$V_{GS} = 0 \text{ V}, \text{ I}_{SD} = 4.5 \text{ A}$			-	-	1.2	V
t <sub>rr</sub>		Recovery Time	voltage		$V_{GS} = 0 V, I_{SD} = 4.5 A,$ $V_{GS} = 0 V, I_{SD} = 4.5 A,$			213	-	ns
Q <sub>rr</sub>		rse Recovery Charge			dl <sub>F</sub> /dt = 100 A/μs		-	2.2	· · ·	μC
lotes: . Repetitive rating . I <sub>AS</sub> = 3 A, R <sub>G</sub> = 2 . I <sub>SD</sub> ≤ 9 A, di/dt ≤	: pulse-width l 25 Ω, starting <sup>-</sup> 200 A/μs, V <sub>DI</sub>	mited by maximum junction ter							U	



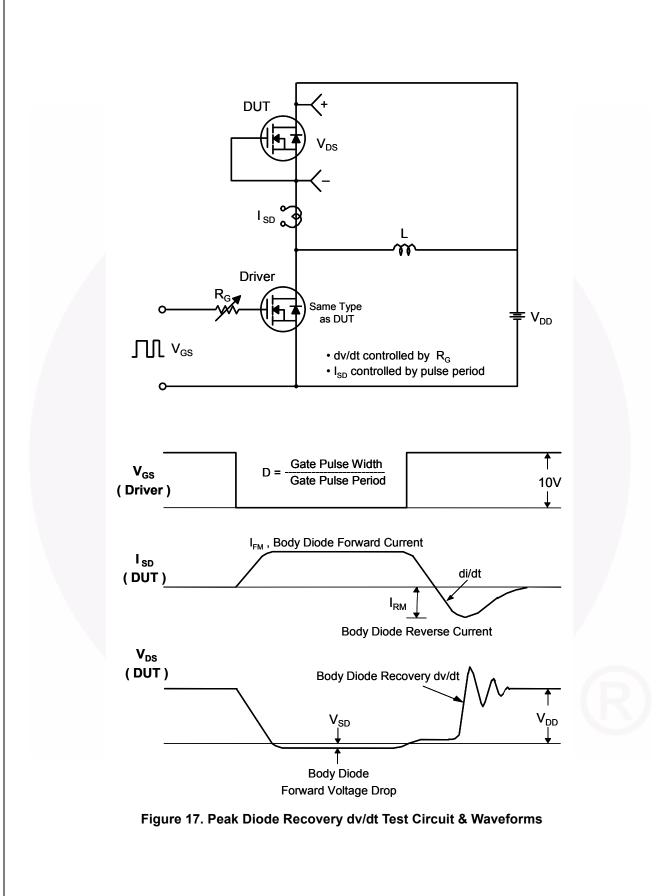


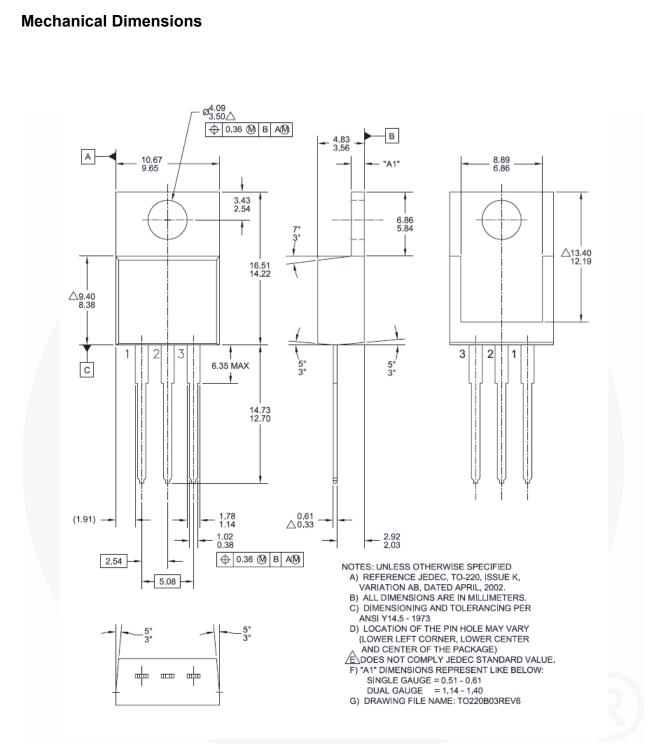






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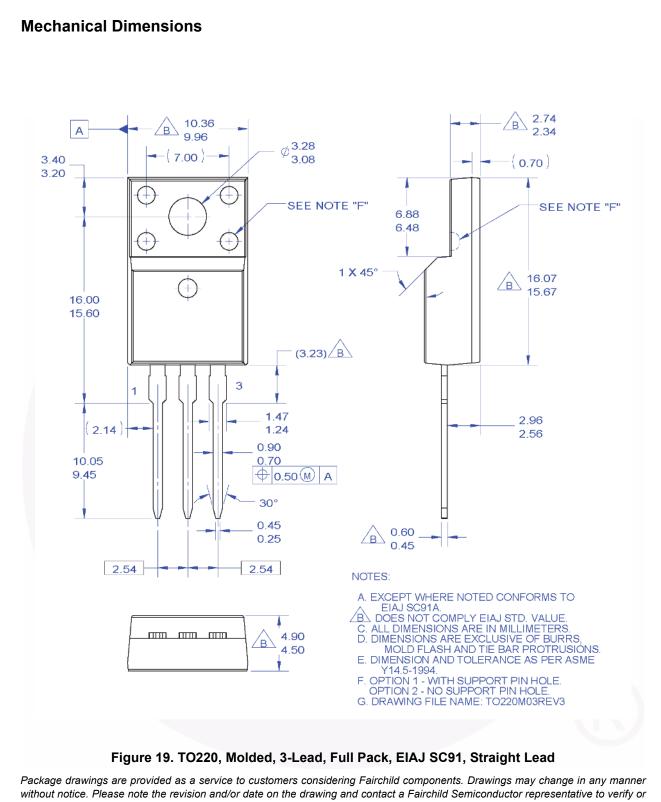


#### Figure 18. TO-220, Molded, 3-Lead, Jedec Variation AB

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FCP9N60N / FCPF9N60NT — N-Channel SupreMOS<sup>®</sup> MOSFET



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No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
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