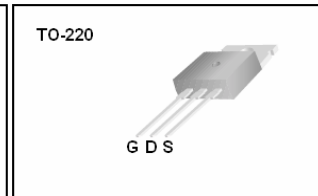
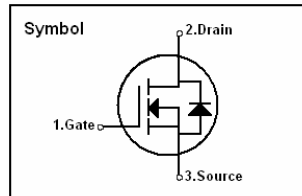


600V N-Channel MOSFET

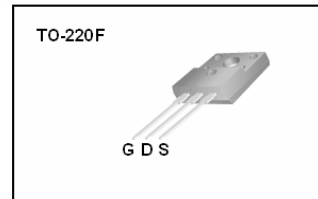
Features

- 2.1A, 600V, $R_{DS(on)}=4.7\Omega @ V_{GS}=10V$
- Gate charge (Typical 15nC)
- High ruggedness
- Fast switching
- 100% Avalanche Tested
- Improved dv/dt capability



General Description

This Power MOSFET is produced using Faircard's advanced planar stripe, DMOS technology. This latest technology has been especially designed to minimize on-state resistance, have a high rugged avalanche characteristics, such as fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics. This power MOSFET is usually used at AC adaptors, on the battery charger and SMPS



Absolute Maximum Ratings

Symbol	Parameter	FSP2N60	FS2N60	Units
V _{DSS}	Drain to Source Voltage	600		V
I _D	Continuous Drain Current (@TC = 25°C)	2.1	2.1*	A
	Continuous Drain Current (@TC = 100°C)	1.3	1.3*	A
I _{DM}	Drain Current Pulsed (Note 1)	8.4	8.4*	A
V _{GS}	Gate to Source Voltage	±30		V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	140		mJ
E _{AR}	Repetitive Avalanche Energy (Note 1)	6.5		mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	4.5		V/ns
P _D	Total Power Dissipation (@TC = 25 °C)	65	28	W
	Derating Factor above 25 °C	0.5	0.21	W/ °C
T _{STG} , T _J	Operating Junction Temperature & Storage Temperature	-55 ~ 150		°C
TL	Maximum Lead Temperature for soldering purpose, 1/8 from Case for 5 seconds.	300		°C

Thermal Characteristics

Symbol	Parameter	FSP2N60	FS2N60	Units
R _{θJC}	Thermal Resistance, Junction-to-Case	1.9	4.5	°C/W
R _{θCS}	Thermal Resistance, Case-to-Sink Typ	0.5	-	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	62.5	62.5	°C/W

FSP2N60/FS2N60

Electrical Characteristics (TC = 25 °C unless otherwise noted)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250uA	600	-	-	V
Δ BV _{DSS} Δ T _J	Breakdown Voltage Temperature coefficient	I _D = 250uA, referenced to 25 °C	-	0.4	-	V/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} = 600V, V _{GS} = 0V	-	-	10	uA
		V _{DS} = 480V, T _C = 125 °C	-	-	100	uA
I _{GSS}	Gate-Source Leakage, Forward	V _{GS} = 30V, V _{DS} = 0V	-	-	100	nA
	Gate-source Leakage, Reverse	V _{GS} = -30V, V _{DS} = 0V	-	-	-100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250uA	2.0	-	4.0	V
R _{DS(ON)}	Static Drain-Source On-state Resistance	V _{GS} = 10 V, I _D = 1.0A	-	4.5	4.7	Ω
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0 V, V _{DS} = 25V, f = 1MHz	-	570	720	pF
C _{oss}	Output Capacitance		-	150	215	
C _{rss}	Reverse Transfer Capacitance		-	310	450	
Dynamic Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = 300V, I _D = 2.1A, R _G = 25 Ω (Note 4, 5)	-	15	35	ns
t _r	Rise Time		-	75	140	
t _{d(off)}	Turn-off Delay Time		-	30	60	
t _f	Fall Time		-	35	60	
Q _g	Total Gate Charge	V _{DS} = 480V, V _{GS} = 10V, I _D = 2.1A (Note 4, 5)	-	15	20	nC
Q _{gs}	Gate-Source Charge		-	1.6	-	
Q _{gd}	Gate-Drain Charge(Miller Charge)		-	6	-	

Source-Drain Diode Ratings and Characteristics

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit.
I _S	Continuous Source Current	Integral Reverse p-n Junction	-	-	2.0	A
I _{SM}	Pulsed Source Current	Diode in the MOSFET	-	-	8.0	
V _{SD}	Diode Forward Voltage	I _S = 2.1A, V _{GS} = 0V	-	-	1.4	V
t _{rr}	Reverse Recovery Time	I _S = 2.1A, V _{GS} = 0V, dI _F /dt = 100A/us	-	820	-	ns
Q _{rr}	Reverse Recovery Charge	I _S = 2.1A, V _{GS} = 0V, dI _F /dt = 100A/us	-	0.82	-	uC

✱ NOTES

1. Repeativity rating : pulse width limited by junction temperature
2. L = 47mH, I_{AS} = 2.1A, V_{DD} = 50V, R_G = 50 Ω , Starting T_J = 25°C
3. I_{SD} \leq 2.1A, di/dt \leq 300A/us, V_{DD} \leq BV_{DSS}, Starting T_J = 25°C
4. Pulse Test : Pulse Width \leq 300us, Duty Cycle \leq 2%
5. Essentially independent of operating temperature.

FSP2N60/FS2N60

Fig 1. On-State Characteristics

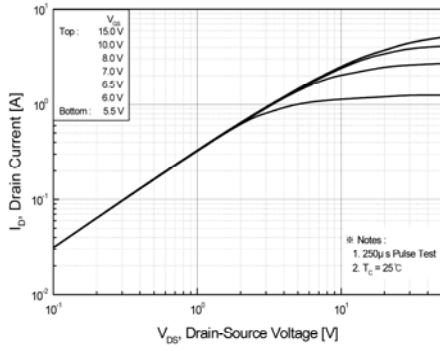


Fig 2. Transfer Characteristics

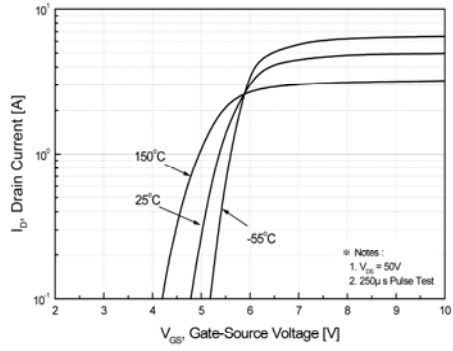


Fig 3. On Resistance Variation vs. Drain Current and Gate Voltage

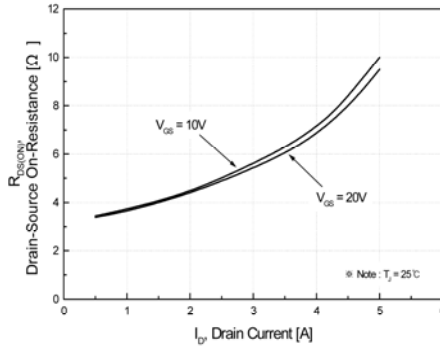


Fig 4. On State Current vs. Allowable Case Temperature

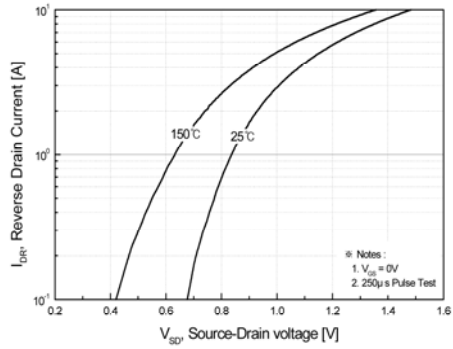


Fig 5. Capacitance Characteristics (Non-Repetitive)

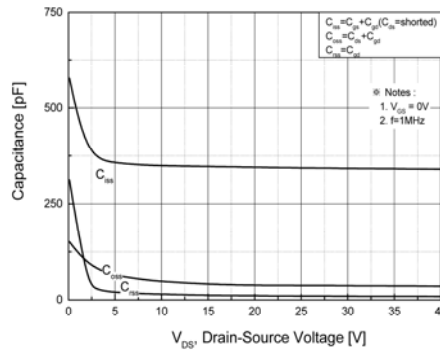
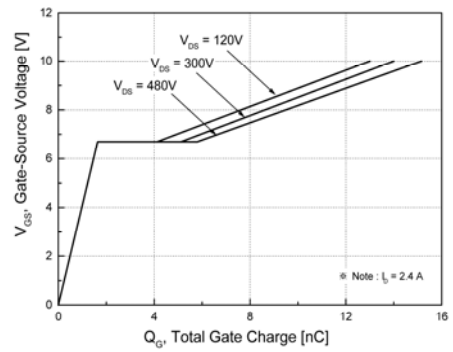


Fig 6. Gate Charge Characteristics



FSP2N60/FS2N60

Fig 7. Breakdown Voltage Variation vs. Junction Temperature

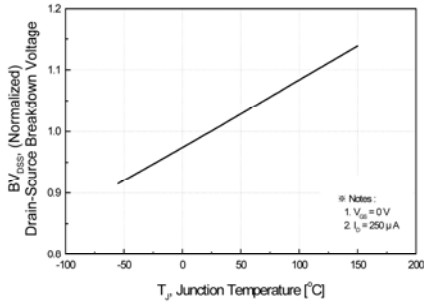


Fig 8. On-Resistance Variation vs. Junction Temperature

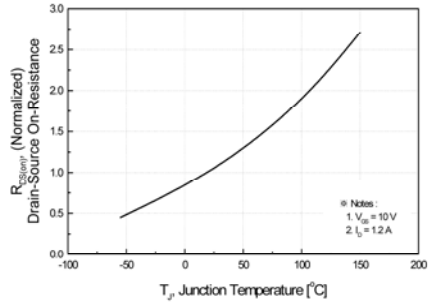


Fig 9 -1. Maximum Safe Operating Area for FSP2N60

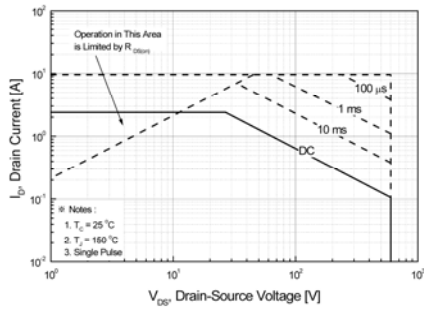


Fig 9 -2. Maximum Safe Operating Area for FS2N60

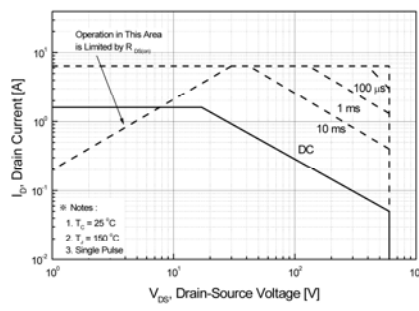


Fig 10. Maximum Drain Current vs. Case Temperature

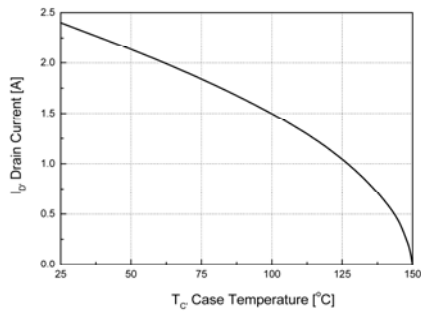


Fig 11-1. Transient Thermal Response Curve for FSP2N60

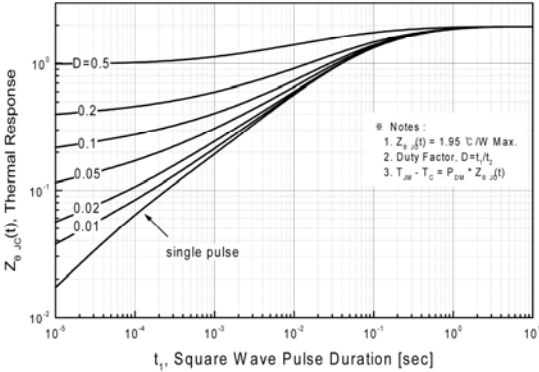
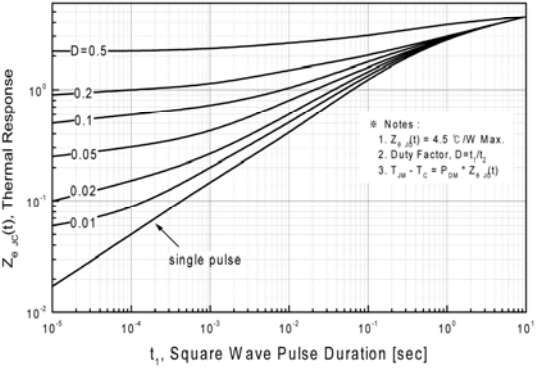


Fig 11-2. Transient Thermal Response Curve for FS2N60



FSP2N60/FS2N60

Fig. 12. Gate Charge Test Circuit & Waveforms

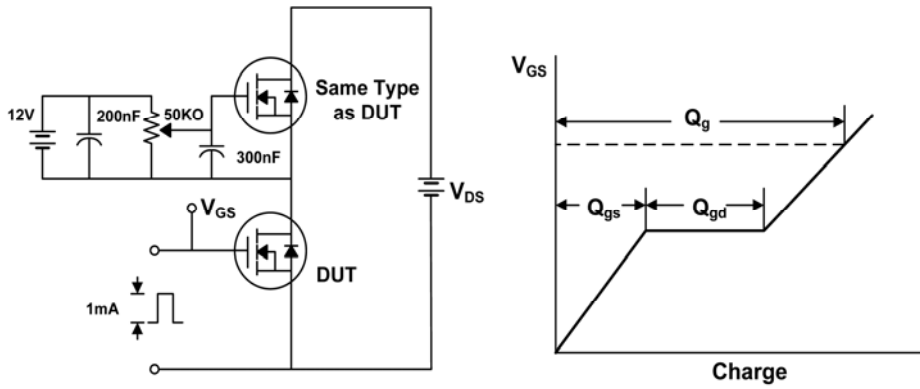


Fig. 13. Switching Time Test Circuit & Waveforms

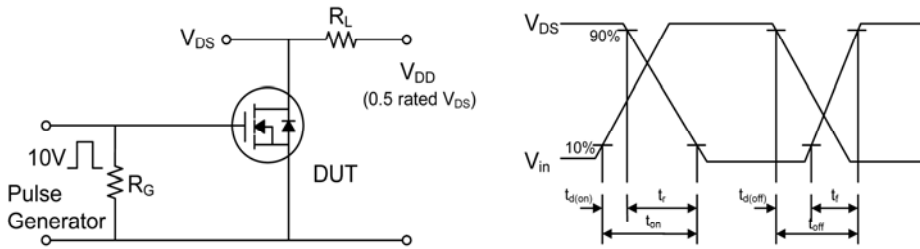


Fig. 14. Unclamped Inductive Switching Test Circuit & Waveforms

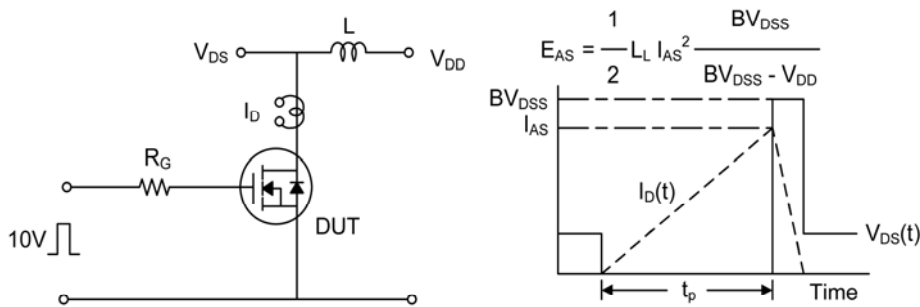
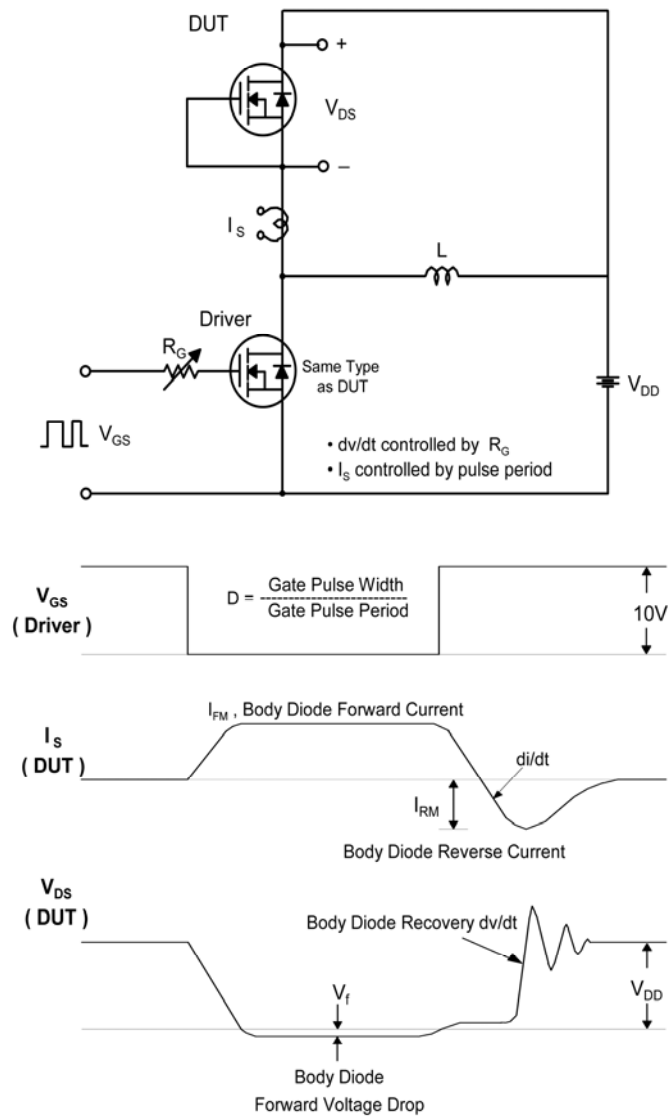


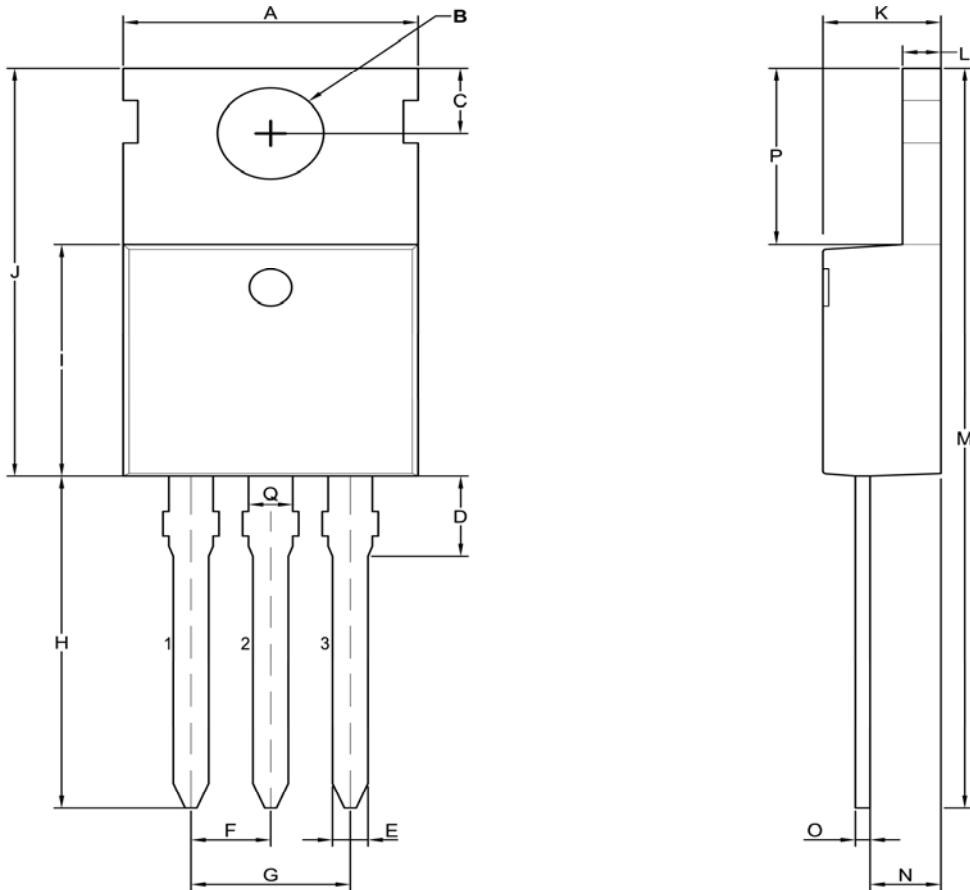
Fig. 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



FSP2N60/FS2N60

Package Dimensions

TO-220

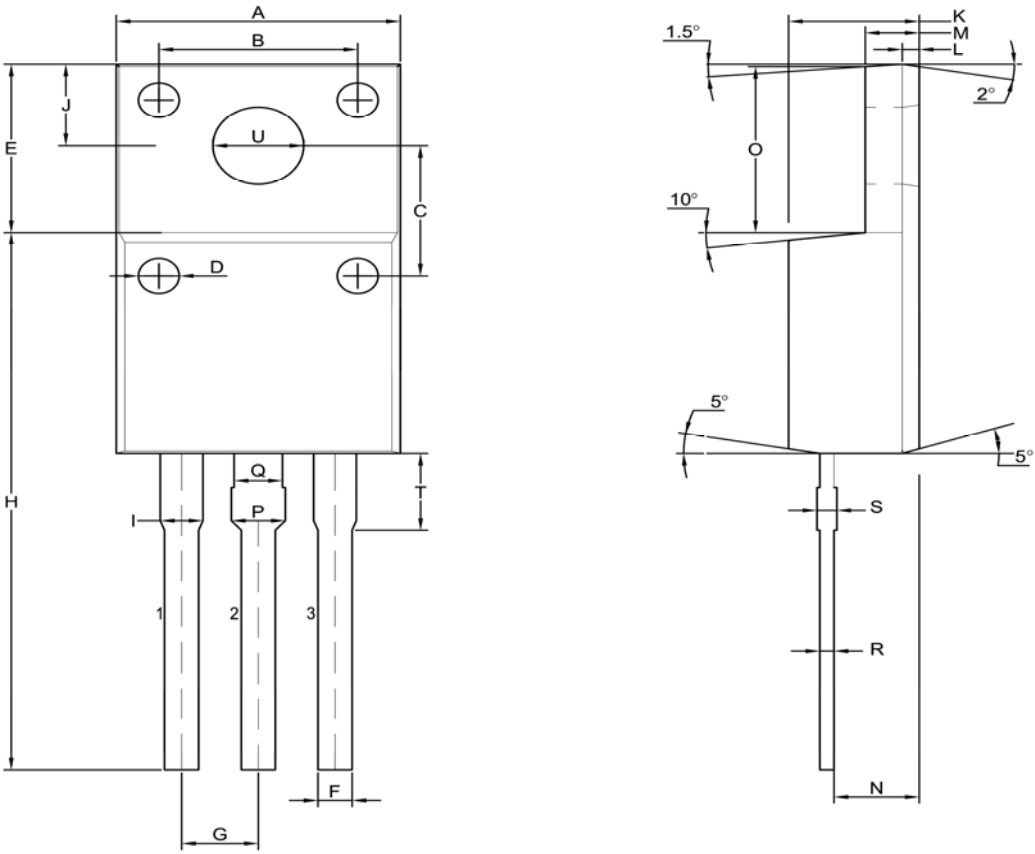


TO-220 DIMENSION			
Symbol	Dimensions in Millimeters		
	Min	Max	Typ
A	10.10	10.35	10.25
B	3.75	3.85	3.80
C	2.50	2.90	2.75
D	3.70	4.50	4.10
E	0.70	0.90	0.80
F	—	—	2.54
G	—	—	5.08
H	13.50	14.20	13.80
I	8.50	9.00	8.80
J	14.80	15.20	15.00
K	4.50	4.58	4.54
L	1.28	1.36	1.32
M	28.60	29.10	28.90
N	2.40	2.90	2.65
O	0.38	0.45	0.40
P	6.20	6.60	6.40
Q	1.30	1.45	1.40

FSP2N60/FS2N60

Package Dimensions

TO-220F



TO-220F DIMENSION			
Symbol	Dimensions In Millimeters		
	Min		Max
A	9.95		10.10
B		6.50(typ)	6.5
C		5.95(typ)	5.95
D		∅ 1.40(typ)	∅ 1.40
E	15.10		15.30
F	0.55		0.70
G	2.35		2.73
H	13.35		13.55
I	1.11		1.45
J	2.90		3.10
K	4.45		4.55
L		1.15(typ)	1.15
M		3.10(typ)	3.10
N	2.60		2.80
O	6.80		7.10
P	1.64		1.70
Q	1.48		1.66
R	0.60		0.68
S	0.62		0.78
T	3.60		3.90
U	3.00		3.20