



N-channel 650V,4A, TO-220F Power MOSFET 功率場效應管

■ Features 特點

Superior Avalanche Rugged Technology 高級雪崩加固技術

Improved dv/dt Capability 強力電壓變率能力

Fast switching 快速開關能力

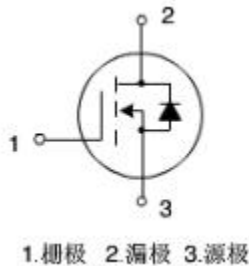
■ Applications 應用

Switch mode power supplies 開關電源

DC-DC converters and UPS 直流直流變換和不間斷電源

Power Factor Correction (PFC) 功率因素校正

■ Internal Schematic Diagram 內部結構



■ Absolute Maximum Ratings 最大額定值

Characteristic 特性參數	Symbol 符號	Rat 額定值	Unit 單位
Drain-Source Voltage 漏極-源極電壓	BV_{DSS}	650	V
Gate- Source Voltage 柵極-源極電壓	V_{GS}	± 30	V
Drain Current (continuous) 漏極電流-連續	I_D	4	A
Drain Current (pulse) 漏極電流-脈衝	I_{DM}	16	A
Power Dissipation 耗散功率	P_D	36	W
Single Pulsed Avalanche Energy 雪崩能量	E_{AS}	260*	mJ
Thermal Resistance ,Junction to Case 結對殼熱阻	$R_{\theta JC}$	3.47	$^{\circ}C/W$
Thermal Resistance ,Junction to Ambient 環境熱阻	$R_{\theta JA}$	62.5	$^{\circ}C/W$
Maximum Lead Solder Temperature 焊接溫度	T_L	260	$^{\circ}C$
Junction/Storage Temperature 結溫/儲存溫度	T_J, T_{stg}	-55~150	$^{\circ}C$

* $I_{AS} = 2.5 A, V_{DD} = 50 V, R_G = 25 \Omega, Starting T_J = 25^{\circ}C$



■ Electrical Characteristics 電特性

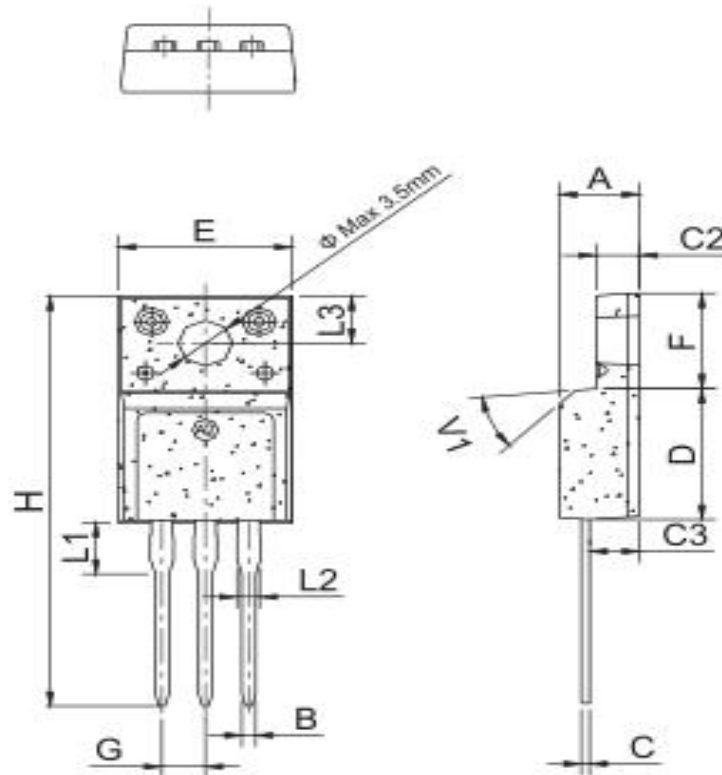
($T_A=25^{\circ}\text{C}$ unless otherwise noted 如無特殊說明，溫度為 25°C)

Characteristic 特性參數	Symbol 符號	Min 最小值	Typ 典型值	Max 最大值	Unit 單位
Drain-Source Breakdown Voltage 漏極-源極擊穿電壓($I_D=250\mu\text{A}, V_{GS}=0\text{V}$)	BV_{DSS}	650	—	—	V
Gate Threshold Voltage 柵極開啓電壓($I_D=250\mu\text{A}, V_{GS}=V_{DS}$)	$V_{GS(th)}$	2	3.2	4	V
Zero Gate Voltage Drain Current 零柵壓漏極電流($V_{GS}=0\text{V}, V_{DS}=600\text{V}$)	I_{DSS}	—	—	1	μA
Gate Body Leakage 柵極漏電流($V_{GS}=\pm 30\text{V}, V_{DS}=0\text{V}$)	I_{GSS}	—	—	± 100	nA
Static Drain-Source On-State Resistance 靜態漏源導通電阻($I_D=4\text{A}, V_{GS}=10\text{V}$)	$R_{DS(ON)}$	—	2.2	2.5	Ω
Input Capacitance 輸入電容 ($V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$)	C_{ISS}	—	530	—	pF
Common Source Output Capacitance 共源輸出電容($V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$)	C_{OSS}	—	80	—	pF
Reverse Transfer Capacitance 回饋電容 ($V_{GS}=0\text{V}, V_{DS}=25\text{V}, f=1\text{MHz}$)	C_{RSS}	—	8	—	pF
Total Gate Charge 柵極電荷密度 ($V_{DS}=480\text{V}, I_D=4\text{A}, V_{GS}=10\text{V}$)	Q_g	—	16	—	nC
Gate Source Charge 柵源電荷密度 ($V_{DS}=480\text{V}, I_D=4\text{A}, V_{GS}=10\text{V}$)	Q_{gs}	—	3.5	—	nC
Gate Drain Charge 柵漏電荷密度 ($V_{DS}=480\text{V}, I_D=4\text{A}, V_{GS}=10\text{V}$)	Q_{gd}	—	7.3	—	nC
Turn-ON Delay Time 開啓延遲時間 ($V_{DS}=300\text{V}, I_D=4\text{A}, R_{GEN}=25\Omega, V_{GS}=10\text{V}$)	$t_{d(on)}$	—	13	—	ns
Rise Time 上升時間 ($V_{DS}=300\text{V}, I_D=4\text{A}, R_{GEN}=25\Omega, V_{GS}=10\text{V}$)	t_r	—	45	—	ns
Turn-OFF Delay Time 關斷延遲時間 ($V_{DS}=300\text{V}, I_D=4\text{A}, R_{GEN}=25\Omega, V_{GS}=10\text{V}$)	$t_{d(off)}$	—	25	—	ns
Fall Time 下降時間 ($V_{DS}=300\text{V}, I_D=4\text{A}, R_{GEN}=25\Omega, V_{GS}=10\text{V}$)	t_f	—	35	—	ns
Drain-Source Diode Forward Current 漏極-源極二極體正向電流	I_s	—	—	4	A
Diode Forward Voltage Drop 內附二極管正向壓降($I_{SD}=4\text{A}, V_{GS}=0\text{V}$)	V_{SD}	—	—	1.5	V

Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$



■TO-220F 外形封裝尺寸(DIMENSION)



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.50		4.90	0.177		0.193
B	0.74	0.80	0.83	0.029	0.031	0.033
C	0.47		0.65	0.019		0.026
C2	2.45		2.75	0.096		0.108
C3	2.60		3.00	0.102		0.118
D	8.80		9.30	0.346		0.366
E	9.80		10.4	0.386		0.410
F	6.40		6.80	0.252		0.268
G		2.54			0.1	
H	28.0		29.8	1.102		1.173
L1		3.63			0.143	
L2	1.14		1.70	0.045		0.067
L3		3.30			0.130	
V1		45°			45°	