

N-CHANNEL MOSFET

SI12N60

主要参数 MAIN CHARACTERISTICS

I_D	12 A
V_{DSS}	600 V
$R_{dson}(@V_{gs}=10V)$	0.65 Ω
Q_g	39nC

用途

- 高频开关电源
- 电子镇流器
- UPS 电源

产品特性

- 低栅极电荷
- 低 C_{rss} (典型值 23pF)
- 开关速度快
- 产品全部经过雪崩测试
- 高抗 dv/dt 能力
- RoHS 产品

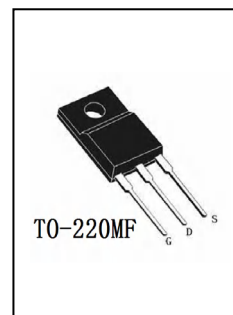
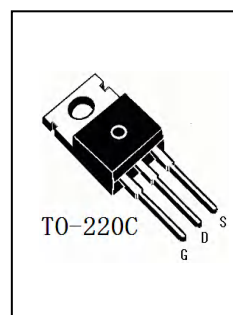
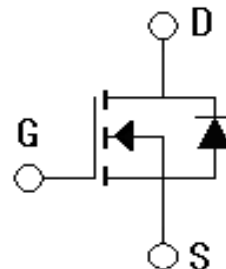
APPLICATIONS

- High efficiency switch mode power supplies
- Electronic lamp ballasts based on half bridge
- UPS

FEATURES

- Low gate charge
- Low C_{rss} (typical 23pF)
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability
- RoHS product

封装 Package



订货信息 ORDER MESSAGE

订货型号 Order codes	印记 Marking	封装 Package	无卤素 Halogen Free	包装 Packaging	器件重量 Device Weight
SI12N60	12N60	TO-220F	否 NO	条管 Tube	2.15 g(typ)

N-CHANNEL MOSFET

SI12N60

绝对最大额定值 ABSOLUTE RATINGS (Tc=25°C)

项 目 Parameter	符 号 Symbol	数 值 Value		单 位 Unit
		SSS12N60		
最高漏极-源极直流电压 Drain-Source Voltage	V_{DSS}	600		V
连续漏极电流 Drain Current -continuous	I_D T=25°C	12		A
最大脉冲漏极电流 (注1) Drain Current - pulse (note 1)	I_{DM}	48		A
最高栅源电压 Gate-Source Voltage	V_{GSS}	±30		V
单脉冲雪崩能量 (注2) Single Pulsed Avalanche Energy (note 2)	E_{AS}	880		mJ
雪崩电流 (注1) Avalanche Current (note 1)	I_{AR}	12		A
重复雪崩能量 (注1) Repetitive Avalanche Current (note 1)	E_{AR}	25		mJ
二极管反向恢复最大电压变化速率 (注3) Peak Diode Recovery dv/dt (note 3)	dv/dt	4.5		V/ns
耗散功率 Power Dissipation	P_D T _C =25°C -Derate above 25°C	250	51	W
		2.0	0.41	W/°C
最高结温及存储温度 Operating and Storage Temperature Range	T _J , T _{STG}	55~+150		°C
引线最高焊接温度 Maximum Lead Temperature for Soldering Purposes	T _L	300		°C

*漏极电流由最高结温限制

*Drain current limited by maximum junction temperature

N-CHANNEL MOSFET

SI12N60

电特性 ELECTRICAL CHARACTERISTICS

项 目 Parameter	符 号 Symbol	测试条件 Tests conditions	最小 Min	典型 Typ	最大 Max	单位 Units
关态特性 Off –Characteristics						
漏-源击穿电压 Drain-Source Voltage	BV_{DSS}	$I_D=250\mu A, V_{GS}=0V$	600	-	-	V
击穿电压温度特性 Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=250\mu A$, referenced to $25^\circ C$	-	0.5	-	V/°C
零栅压下漏极漏电流 Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=600V, V_{GS}=0V,$ $T_C=25^\circ C$	-	-	1	μA
正向栅极体漏电流 Gate-body leakage current, forward	I_{GSSF}	$V_{DS}=0V, V_{GS}=30V$	-	-	100	nA
反向栅极体漏电流 Gate-body leakage current, reverse	I_{GSSR}	$V_{DS}=0V, V_{GS}=-30V$	-	-	-100	nA
通态特性 On-Characteristics						
阈值电压 Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D=250\mu A$	3.0	-	4.5	V
静态导通电阻 Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS} = 10V, I_D=6A$	-	0.56	0.65	Ω
正向跨导 Forward Transconductance	g_{fs}	$V_{DS} = 40V, I_D=6A$ (note 4)	-	13	-	S
动态特性 Dynamic Characteristics						
输入电容 Input capacitance	C_{iss}	$V_{DS}=25V,$ $V_{GS}=0V,$ $f=1.0MHz$	-	1790	2410	pF
输出电容 Output capacitance	C_{oss}		-	175	229	pF
反向传输电容 Reverse transfer capacitance	C_{rss}		-	23	31	PF

N-CHANNEL MOSFET

SI12N60

电特性 ELECTRICAL CHARACTERISTICS

开关特性 Switching Characteristics						
延迟时间 Turn-On delay time	$t_{d(on)}$	$V_{DD}=300V, I_D=12A, R_G=25\Omega$ (note 4, 5)	-	78	102	ns
上升时间 Turn-On rise time	t_r		-	133	175	ns
延迟时间 Turn-Off delay time	$t_{d(off)}$		-	233	305	ns
下降时间 Turn-Off Fall time	t_f		-	104	160	ns
栅极电荷总量 Total Gate Charge	Q_g	$V_{DS}=480V,$ $I_D=12A$ $V_{GS}=10V$ (note 4, 5)	-	39	52	nC
栅-源电荷 Gate-Source charge	Q_{gs}		-	8.5	-	nC
栅-漏电荷 Gate-Drain charge	Q_{gd}		-	20	-	nC
漏-源二极管特性及最大额定值 Drain-Source Diode Characteristics and Maximum Ratings						
正向最大连续电流 Maximum Continuous Drain-Source Diode Forward Current		I_S	-	-	12	A
正向最大脉冲电流 Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}	-	-	48	A
正向压降 Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=12A$	-	-	1.39	V
反向恢复时间 Reverse recovery time	t_{rr}	$V_{GS}=0V, I_S=12A$ $di/dt=100A/\mu s$ (note 4)	-	418	-	ns
反向恢复电荷 Reverse recovery charge	Q_{rr}		-	4.85	-	μC

热特性 THERMAL CHARACTERISTIC

项 目 Parameter	符 号 Symbol	最大 Max		单 位 Unit
		JCS12N60CT	JCS12N60FT	
结到管壳的热阻 Thermal Resistance, Junction to Case	$R_{th(j-c)}$	0.5	2.45	$^{\circ}C/W$
结到环境的热阻 Thermal Resistance, Junction to Ambient	$R_{th(j-A)}$	62.5	62.5	$^{\circ}C/W$

注释:

- 1 脉冲宽度由最高结温限制
- 2: $L=11.2mH, I_{AS}=12A, V_{DD}=50V, R_G=25\Omega$, 起始结温 $T_J=25^{\circ}C$
- 3: $I_{SD} \leq 12A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$, 起始结温 $T_J=25^{\circ}C$
- 4: 脉冲测试: 脉冲宽度 $\leq 300\mu s$, 占空比 $\leq 2\%$
- 5: 基本与工作温度无关

Notes:

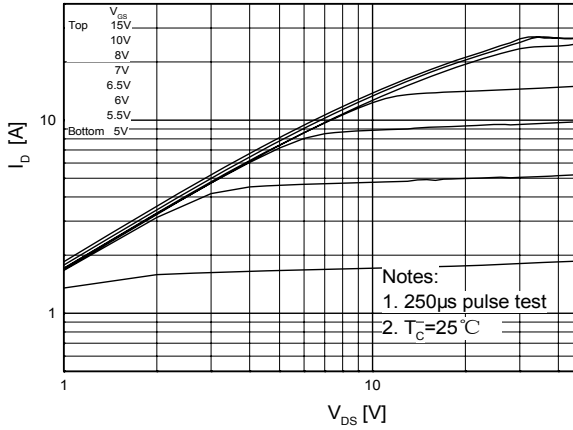
- 1: Pulse width limited by maximum junction temperature
- 2: $L=11.2mH, I_{AS}=12A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^{\circ}C$
- 3: $I_{SD} \leq 12A, di/dt \leq 300A/\mu s, V_{DD} \leq BV_{DSS}$, Starting $T_J=25^{\circ}C$
- 4: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$
- 5: Essentially independent of operating temperature

N-CHANNEL MOSFET

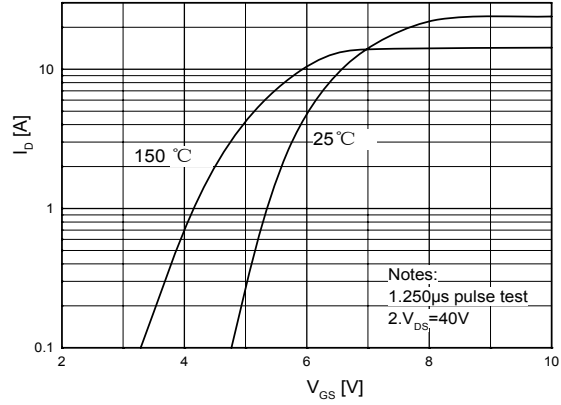
SI12N60

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

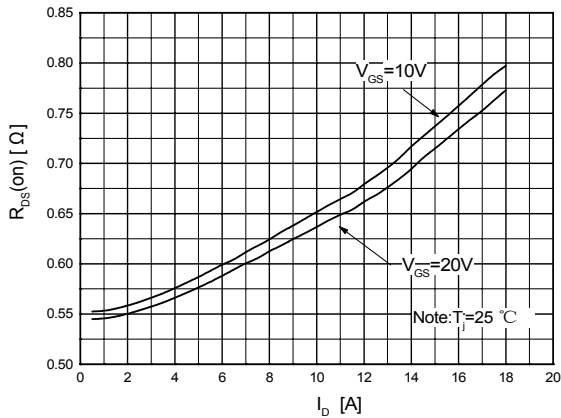
On-Region Characteristics



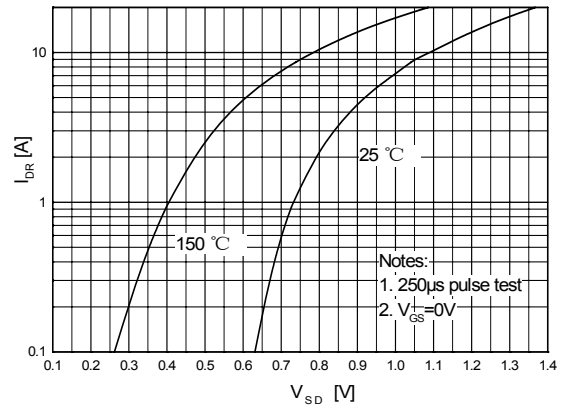
Transfer Characteristics



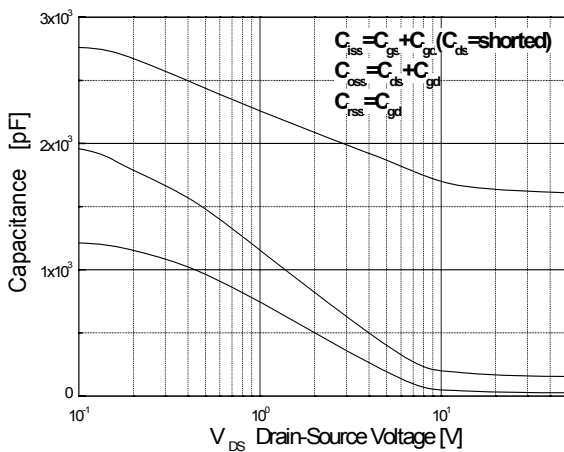
On-Resistance Variation vs. Drain Current and Gate Voltage



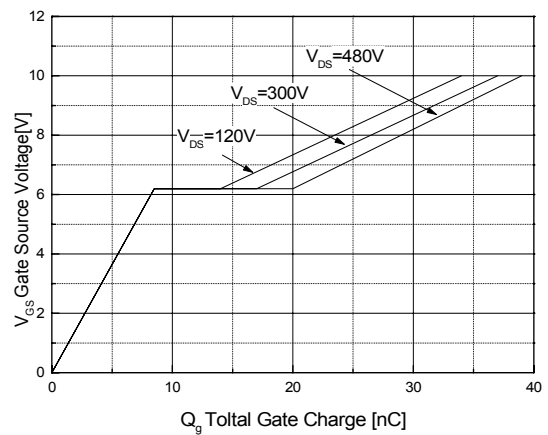
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance Characteristics



Gate Charge Characteristics

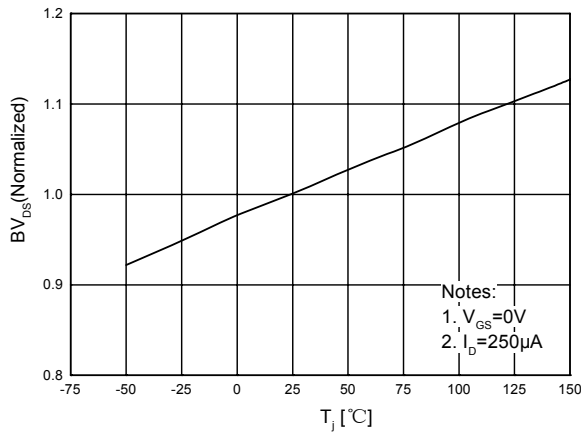


N-CHANNEL MOSFET

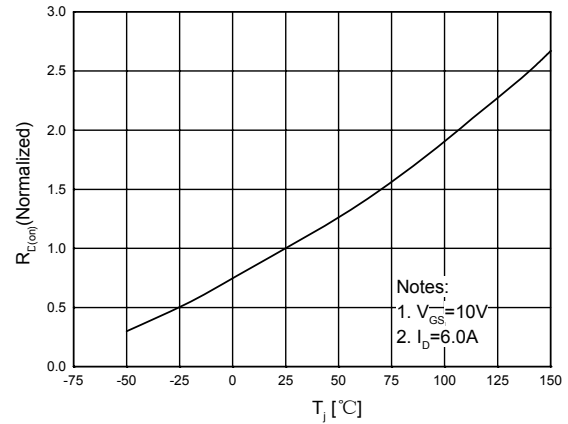
SI12N60

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

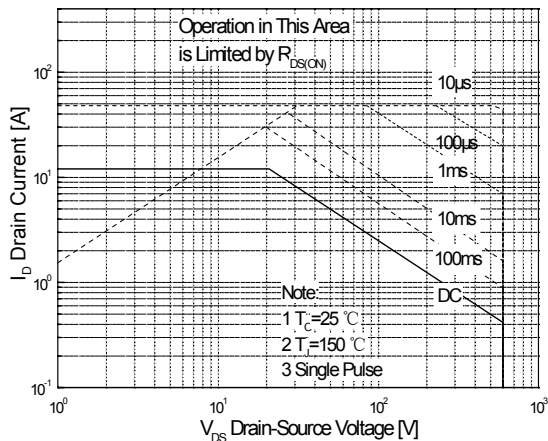
Breakdown Voltage Variation vs. Temperature



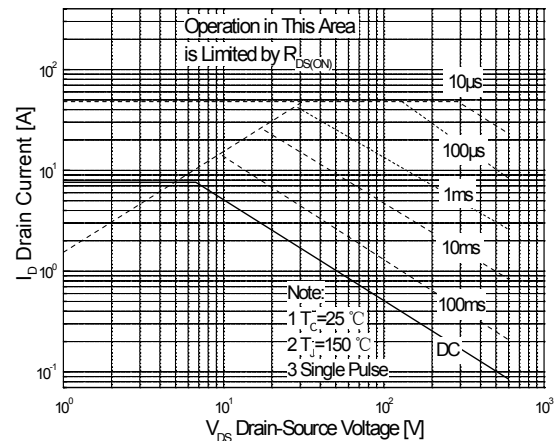
On-Resistance Variation vs. Temperature



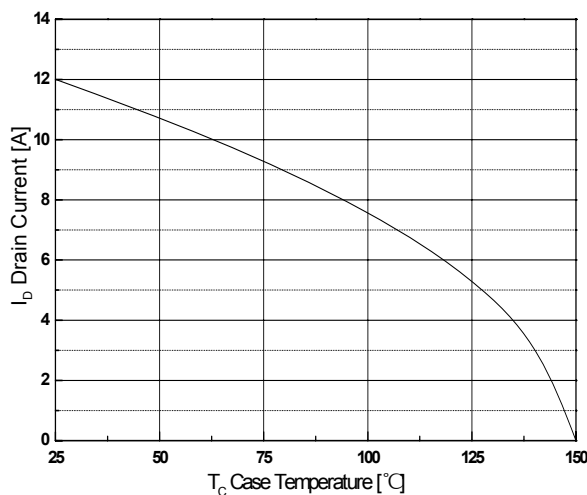
Maximum Safe Operating Area For SSS12N60



Maximum Safe Operating Area For SSS12N60



Maximum Drain Current vs. Case Temperature

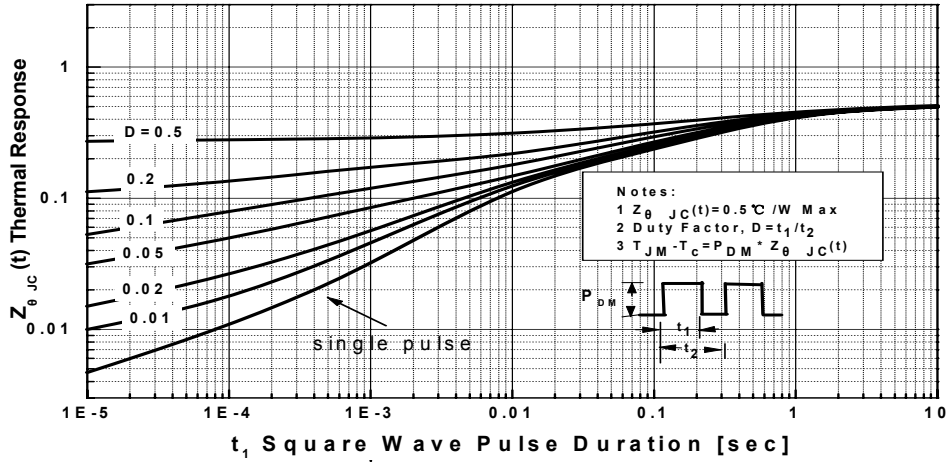


N-CHANNEL MOSFET

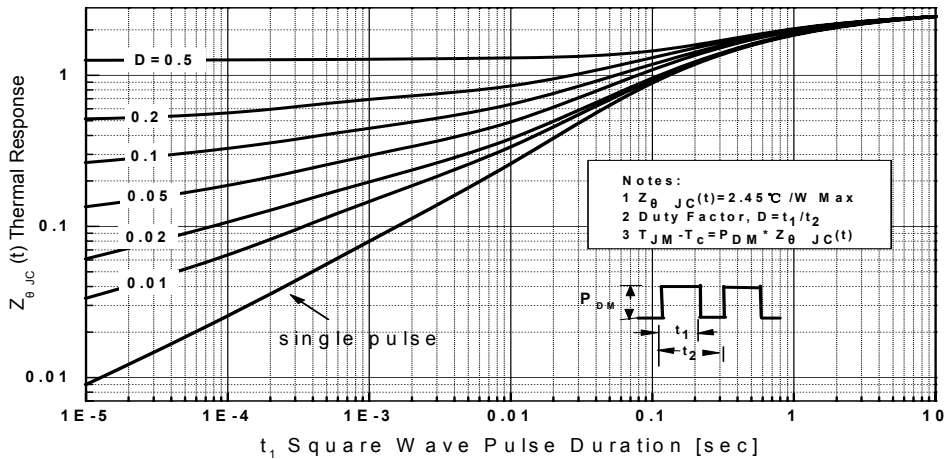
SI12N60

特征曲线 ELECTRICAL CHARACTERISTICS (curves)

Transient Thermal Response Curve For SSS12N60



Transient Thermal Response Curve For SSS12N60



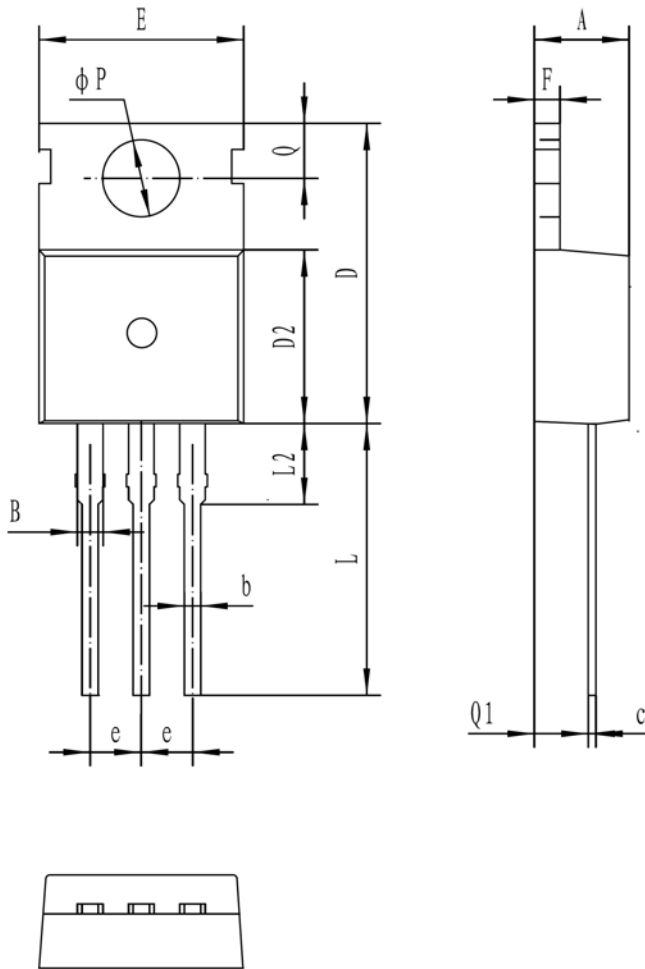
N-CHANNEL MOSFET

SI12N60

外形尺寸 PACKAGE MECHANICAL DATA

TO-220F

单位 Unit: mm



符号 symbol	MIN	MAX
A	4.30	4.70
B	1.22	1.47
b	0.70	0.95
c	0.40	0.65
D	15.20	16.20
D2	9.00	9.40
E	9.70	10.10
e	2.39	2.69
F	1.25	1.40
L	12.60	13.60
L2	2.80	3.20
Q	2.60	3.00
Q1	2.20	2.60
P	3.50	3.80

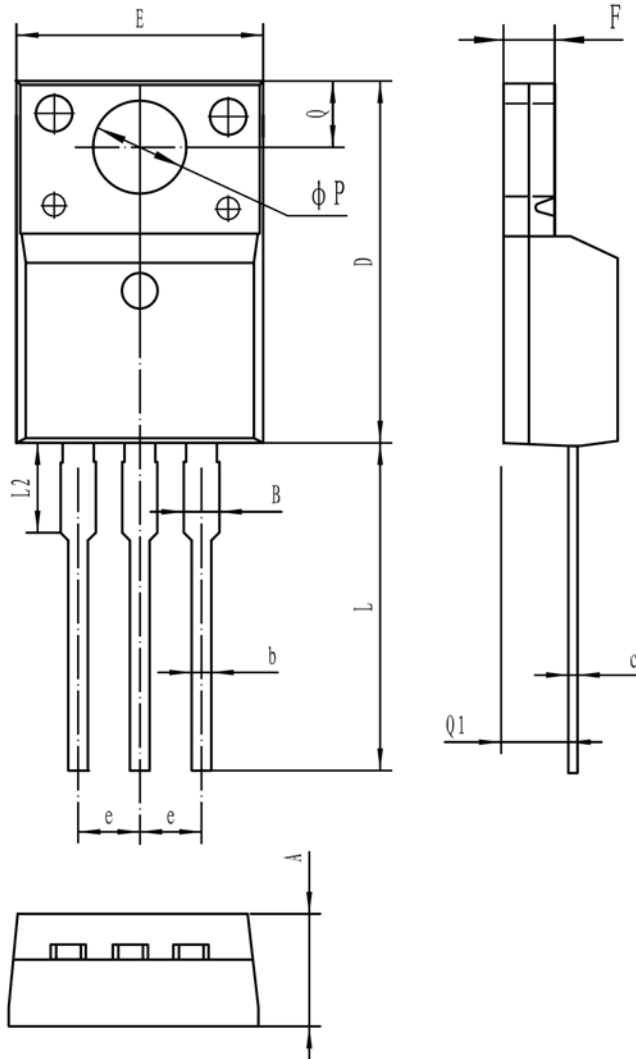
N-CHANNEL MOSFET

SI12N60

外形尺寸 PACKAGE MECHANICAL DATA

TO-220MF

单位 Unit: mm



符号 Symbol	MIN	MAX
A	4.5	4.9
B	-	1.47
b	0.7	0.9
c	0.45	0.6
D	15.67	16.07
E	9.96	10.36
e	2.54TYPE	
F	2.34	2.74
L	12.58	13.38
L2	3.13	3.33
ΦP	3.08	3.28
Q	3.2	3.4
Q1	2.56	2.96