FAIRCHILD SEMICONDUCTOR®

2017 年 9 月

FCA47N60

N 沟道 SuperFET® MOSFET

600 V, 47 A, 70 mΩ

特性

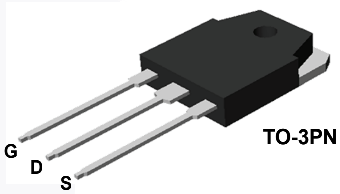
- 650 V @ T_J = 150°C
- 典型值 $R_{DS(on)}$ = 58 mΩ
- 超低栅极电荷 （典型值 Q_g= 210 nC)
- 低有效输出电容 （典型值 $C_{oss(eff.)}$= 420 pF)
- 100% 经过雪崩测试

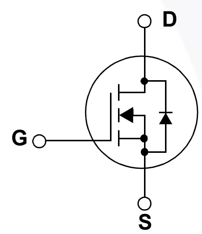
应用

- 太阳能逆变器
- AC-DC 电源

描述

SuperFET®MOSFET 是飞兆半导体第一代利用电荷平衡技术实现出色低导通电阻和更低栅极电荷性能的高压超级结 (SJ)MOSFET 系列产品。这项技术专用于最小化导通损耗并提供卓越的开关性能、dv/dt 额定值和更高雪崩能量。因此，SuperFET MOSFET 非常适用于开关电源应用，如功率因数校正 (PFC)、服务器 / 电信电源、平板电视电源、 ATX 电源及工业电源应用等。





绝对最大额定值

符号	参数		FCA47N60	FCA47N60_F109	单位
V_{DSS}	漏极－源极电压		600		V
I_D	漏极电流	- 连续 (T_C = 25°C) - 连续 (T_C = 100°C)	47 29.7		A A
I_{DM}	漏极电流	- 脉冲 （注 1）	141		A
V_{GSS}	栅极至源极电压		± 30		V
E_{AS}	单脉冲雪崩能量	（注 2）	1800		mJ
I_{AR}	雪崩电流	（注 1）	47		A
E_{AR}	重复雪崩能量	（注 1）	41.7		mJ
dv/dt	二极管恢复 dv/dt 峰值	（注 3）	4.5		V/ns
P_D	功耗	(T_C = 25°C) - 高于 25°C 的功耗系数	417 3.33		W W/°C
T_J, T_{STG}	工作和存储温度范围		-55 至 +150		°C
T_L	用于焊接的最大引脚温度，距离外壳 1/8”，持续 5 秒		300		°C

热性能

符号	参数	典型值	最大值	单位
$R_{\theta JC}$	结至外壳热阻最大值	--	0.3	°C/W
$R_{\theta JA}$	结至环境热阻最大值	--	41.7	°C/W

封装标识与定购信息

器件标识	器件	封装	卷尺寸	带宽	数量
FCA47N60	FCA47N60	TO-3PN	-	-	30
FCA47N60	FCA47N60_F109	TO-3PN	-	-	30

电气特性 T_C = 25°C 除非另有说明。

符号	参数	测试条件	最小值	典型值	最大值	单位
关断特性						
BV_{DSS}	漏极一源极击穿电压	V_{GS} = 0 V, I_D = 250 μA, T_J = 25°C	600	--	--	V
		V_{GS} = 0 V, I_D = 250 μA, T_J = 150°C	--	650	--	V
ΔBV_{DSS} / ΔT_J	击穿电压温度系数	I_D = 250 μA, 参考 25°C 数值	--	0.6	--	V/°C
BV_{DS}	漏极一源极雪崩击穿电压	V_{GS} = 0 V, I_D = 47 A	--	700	--	V
I_{DSS}	零栅极电压漏极电流	V_{DS} = 600 V, V_{GS} = 0 V V_{DS} = 480 V, T_C = 125°C	-- --	-- --	1 10	μA μA
I_{GSSF}	栅极 - 体漏电流，正向	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	栅极 - 体漏电流，反向	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
导通特性						
$V_{GS(th)}$	栅极阈值电压	V_{DS} = V_{GS}, I_D = 250 μA		3.0	--	5.0
$R_{DS(on)}$	漏极一源极 导通电阻	V_{GS} = 10 V, I_D = 23.5 A		--	0.058	0.07
g_{FS}	正向跨导	V_{DS} = 20 V, I_D = 23.5 A		--	40	--
$V_{GS(th)}$	栅极阈值电压	V_{DS} = V_{GS}, I_D = 250 μA		3.0	--	5.0
动态特性						
C_{iss}	输入电容	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHz	--	5900	8000	pF
C_{oss}	输出电容		--	3200	4200	pF
C_{rss}	反向传输电容		--	250	--	pF
C_{oss}	输出电容	V_{DS} = 480 V, V_{GS} = 0 V, f = 1.0 MHz	--	160	--	pF
C_{oss} eff.	有效输出电容	V_{DS} = 0 V 至 400 V, V_{GS} = 0 V	--	420	--	pF
开关特性						
$t_{d(on)}$	导通延迟时间	V_{DD} = 300 V, I_D = 47 A R_G = 25 Ω （注 4）	--	185	430	ns
t_r	导通上升时间		--	210	450	ns
$t_{d(off)}$	关断延迟时间		--	520	1100	ns
t_f	关断下降时间		--	75	160	ns
Q_g	总栅极电荷	V_{DS} = 480 V, I_D = 47 A V_{GS}=10 V （注 4）	--	210	270	nC
Q_{gs}	栅源极电荷		--	38	--	nC
Q_{gd}	栅漏极电荷		--	110	--	nC

漏极 - 源极二极管特性

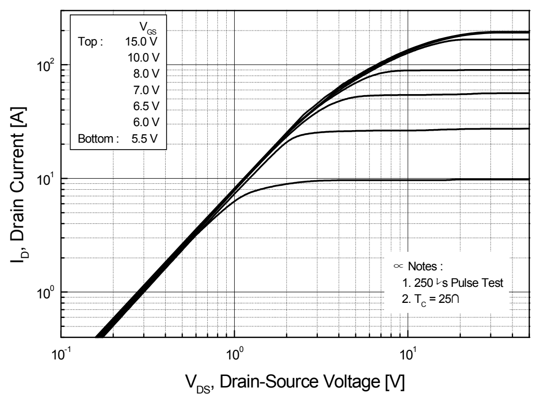
符号	参数	测试条件	最小值	典型值	最大值	单位
I_S	漏源极二极管最大正向连续电流		--	--	47	A
I_{SM}	漏源极二极管最大正向脉冲电流		--	--	141	A
V_{SD}	漏极 - 源极二极管正向电压	V_{GS} = 0 V, I_S = 47 A	--	--	1.4	V
t_{rr}	反向恢复时间	V_{GS} = 0 V, I_S = 47 A dI_F/dt =100 A/μs （注 4）	--	590	--	ns
Q_{rr}	反向恢复电荷		--	25	--	μC

注：

1. 重复额定值：脉冲宽度受限于最大结温。
2. I_{AS} = 18 A, R_G = 25 Ω, 开始于 T_J = 25°C
3. I_{SD} ≤ 47 A, di/dt ≤ 200 A/μs, V_{DD} = 380 V, 开始于 T_J = 25°C
4. 典型特性本质上独立于工作温度。

典型特性

图 **1.** 导通区域特性图



2. 传输特性

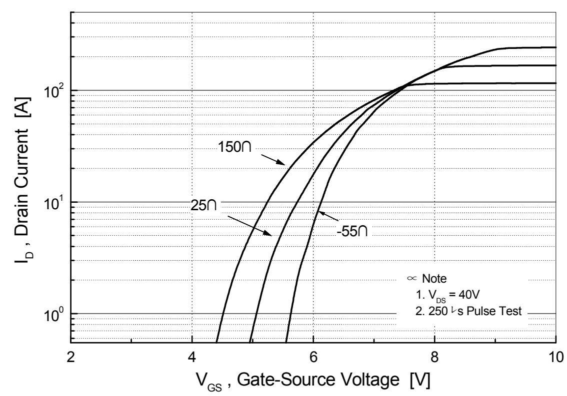


图 **3.** 导通电阻变化与漏极电流和栅极电压的关系

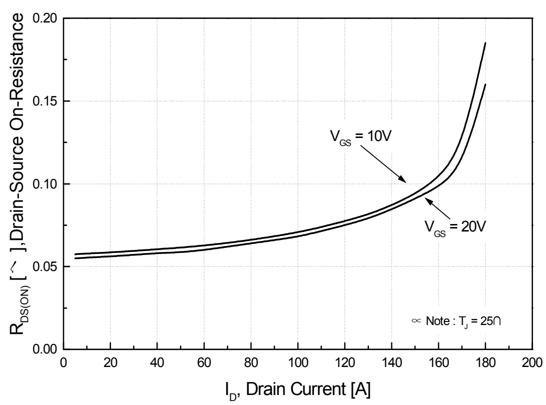


图 **4.** 体二极管正向电压变化与源电流和温度的关系

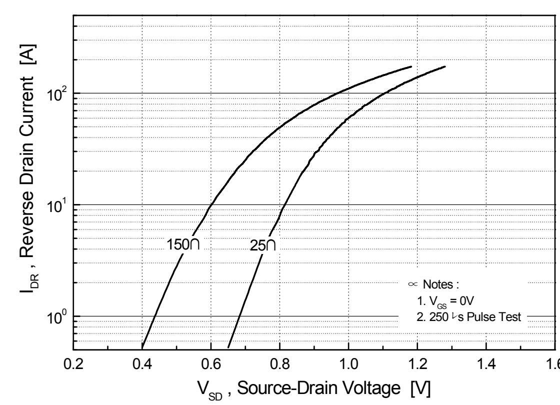


图 **5.** 电容特性

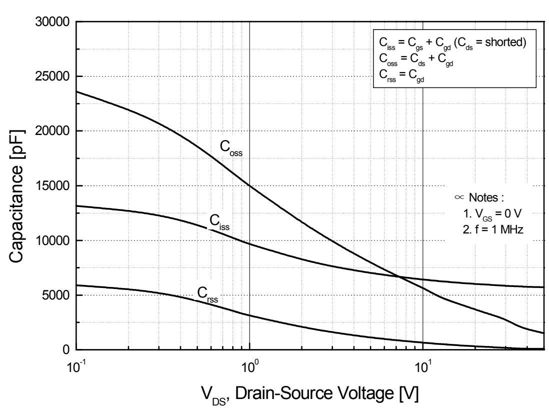
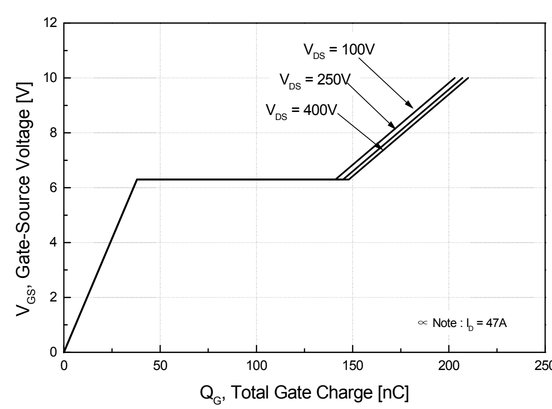


图 **6.** 栅极电荷特性



典型特性 （接上页）

图 **7.** 击穿电压变化与温度的关系

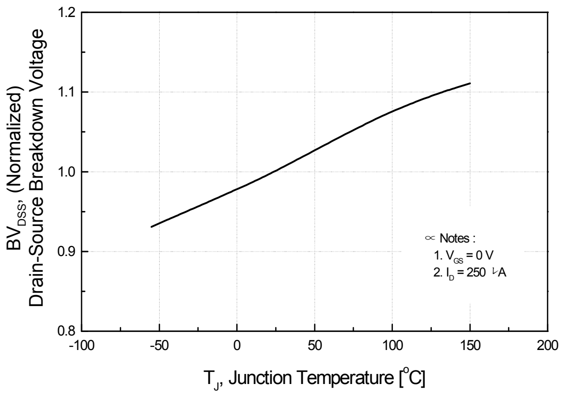


图 **8.** 导通电阻变化与温度的关系

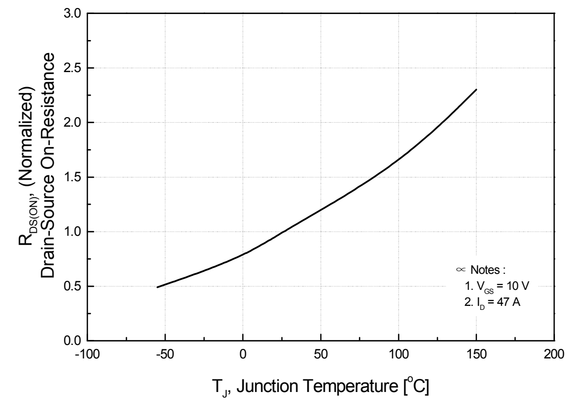


图 **9.** 最大安全工作区与壳温的关系

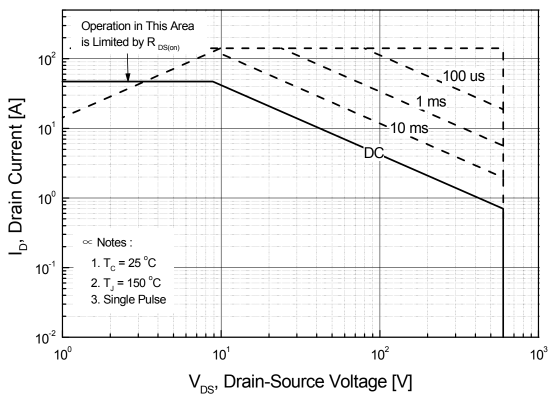


图 **10.** 最大漏极电流

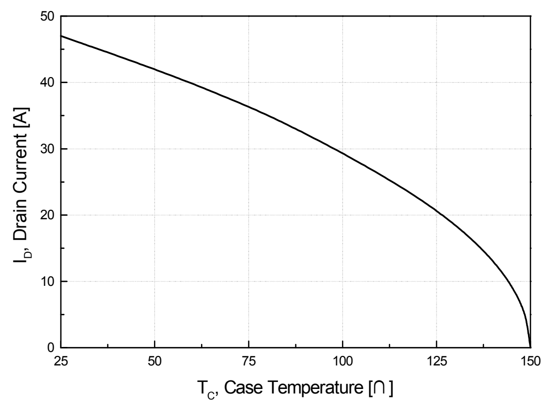


图 **11.** 瞬态热响应曲线

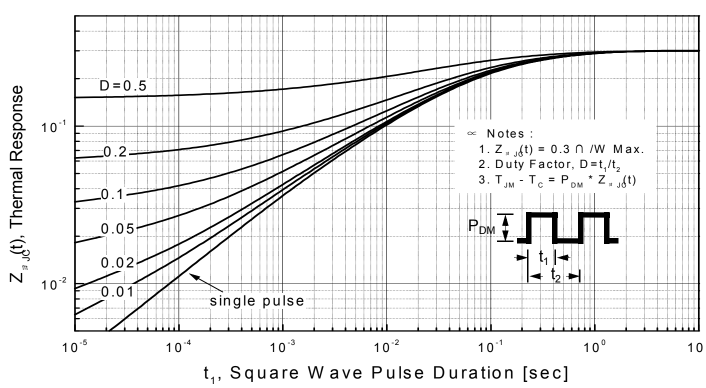


图 **12.** 栅极电荷测试电路与波形

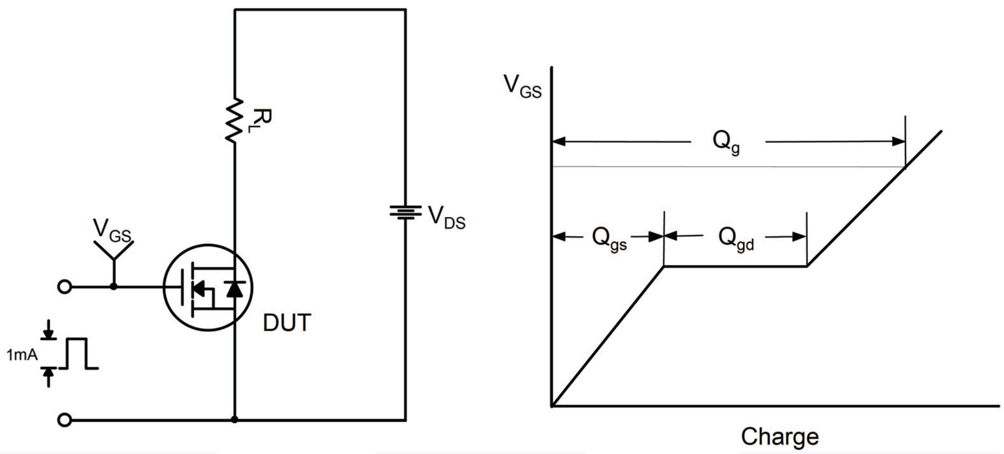


图 **13.** 阻性开关测试电路与波形

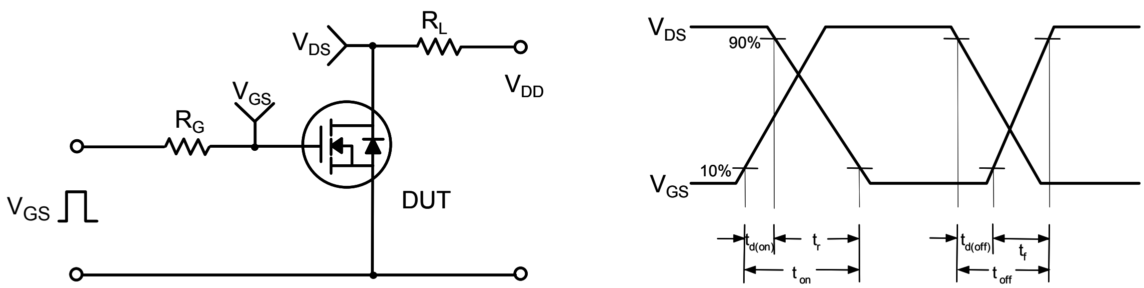


图 **14.** 非箝位感性开关测试电路与波形

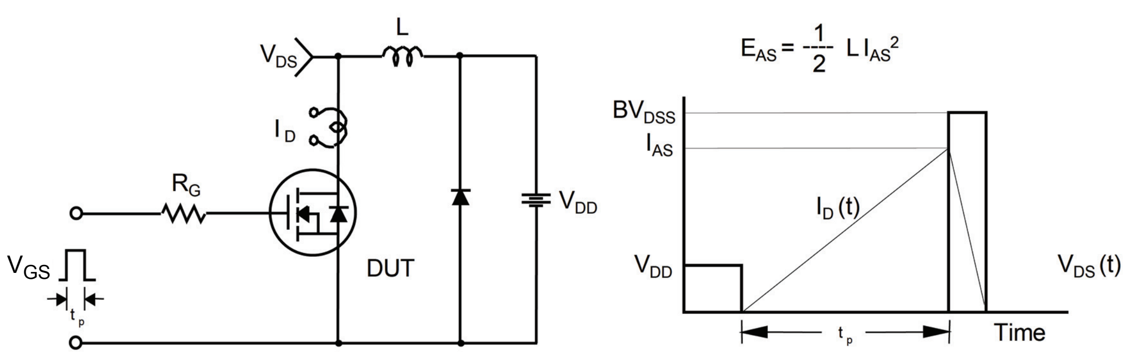
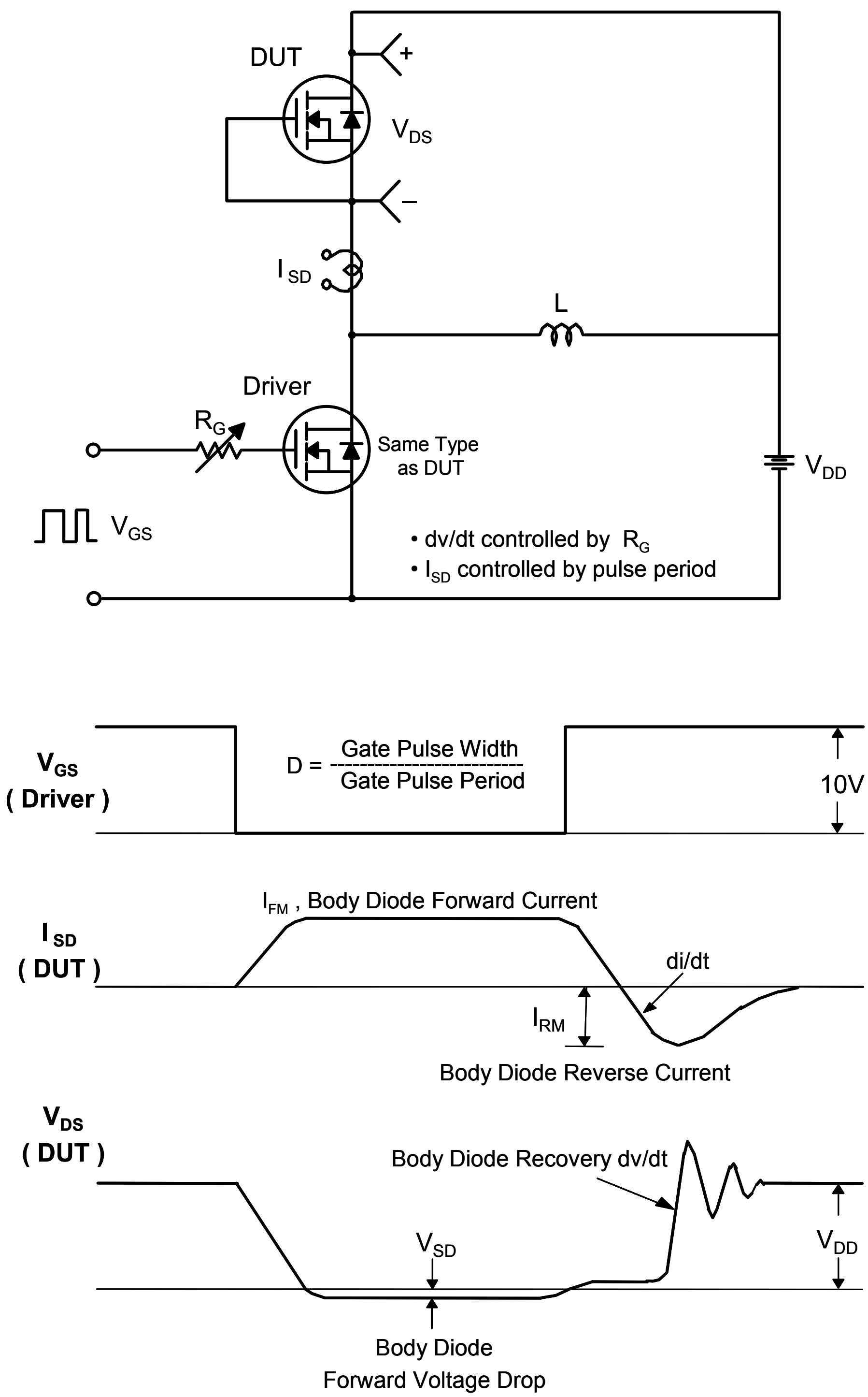


图 **15.** 峰值二极管恢复 **dv/dt** 测试电路与波形



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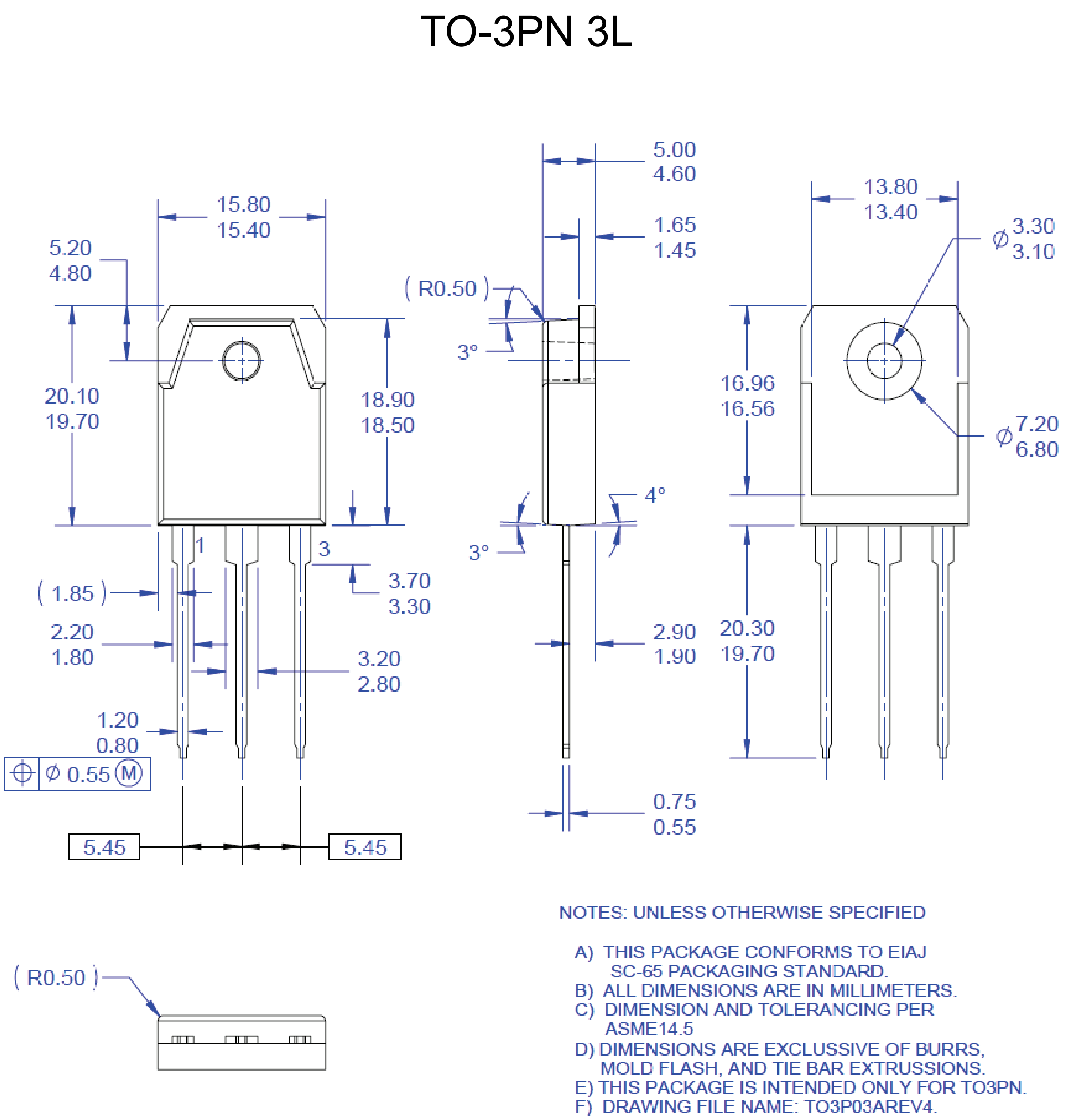

图 16. TO3， 3 引脚、塑料， EIAJ SC-65

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Rev. I66