

jm¹iã@j @t°Ê; -B°Ê¾É½zu³q±¹³17±ø±½u; A¹C±@±ø±½u³£·¥] §±±°wÀY°ö, ðjn



³]p±uµ { @v³Ì±` , I¹i^{ao}ÝÃD±§±@ ; A¹N- O²yÂI¹ x° , } ; i]
BGA ; ^ < Ê , Ê^{ao} ± ´ ´ ú ; CÀHµ Û ´ t²Î ± K < ×^{ao} ´ £ °
ª©MPCB¼h¼Æ¶q^{ao}¼W¥[; A·U´Ó·U|h^{ao} «H, ¹¥u´ à±qBGA «Ê, Ê
breakout via
pattern ; ^´ ´ ú ± o ; C± ´ ´ ú³o´ Ç «H, ¹^{ao}¶Ç²Î±èªk ; A-O¥H±±^{ao}
Ê^{ao}±è ; i Áý±´ °
wÀ Y ± µ Ä²Áá³q±Ö ; C³o¶µ¾P§ @ «D±´ §xÃø ; A¹i©ó±´ n°
ð:æ:n|h, ^{ao}ÁPçè±ÀªR» ò¶q´ ´ ú´ ´ Ó ; ´ ´ Á±£!X¾A ; C´ ´ Ý¹ªy¥§½u²k±µ
damped wire solder down ; ^°t¥ó ; A¥i¥H, Ñ´ ´ M³oÓ°ÝÃD ; C

!b©Ò!³^{ao}- B°Ê¾É½u°t¥ó±± ; Aªy¥§½u°
t¥ó´ £´ ´ Ñ±F³Ì±j^{ao}³s±µ¼u©Ê ; A¥i¥i¥H³s±µ´ ´ ì¥Ø¼D±W·¥±p^{ao}- S(
feature ; ^¥H§Q±´ ´ ú ; Cªy¥§½u°t¥ó^{ao} ; y°Ý¥] §t± -
Óªy¥§¹qªy ; A¥i¥H±N¥Ø¼D©M1´ ´ ¹q½u^{ao}q@e¹j¶}´ ´ Ó ; C¥i±j

- à°§C!bÁPçè±ÀªR» ò´ ´ ú, Ö±´ ´ Ý¶[±JÁB¥~^{ao}-
y, ñªø < × @É©Ò±pµo±§¥ð!ó±Í@g ; Cªy¥§½u¥iÁs!± ; A©Ò¥H!b©w!ì©M²k±µ@É³£´ ´ à»´ ´ ©ð!a¾PÁa ; C¥i´ ´ à±´ ´ ú°
ª±K < ×^{ao} «H, ¹ ; A´ ´ Ò!p²k±µ!bÁá³q±Ö©M¥~ÁS^{ao}y, ñ±W ; C!¥~ ; A¥i¥i¥H1500Mt/s^{ao}t < ×° ð:æ¶q´ ´ ú ; At, ü¶È1.3pF ; C

iÖ¥»¹Áã¥Ü²k±µ!b¶¶¶¶Z-¹1mm^{ao}BGA±À½uÁá³q±Ö±§ªy¥§½u°t¥ó ; C°t¥ó ; j
-ð!â ; ^¥iª½±µ·Æ±J±´ ´ °wÀ Y ; jÁÁ!â ; ^^{ao}´ ´ ; @y±± ; C!Ö

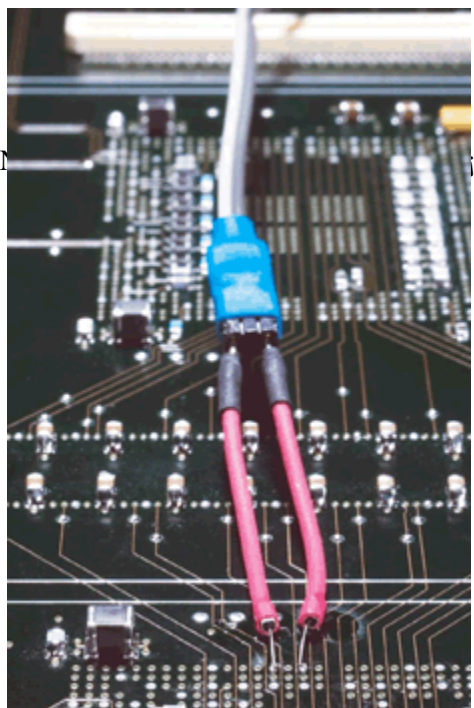
jm¹iãG ; @!b©Ò!³- B°Ê¾É½u°
t¥ó±± ; Aªy¥§½u²k±µ°
t¥ó´ £´ ´ Ñ±F³Ì±j^{ao}³s±µ¼u©Ê ; n

SMT±, ¥ó^{ao}§K¥i±±´ ´ ú, Ñ´ ´ M±è@×

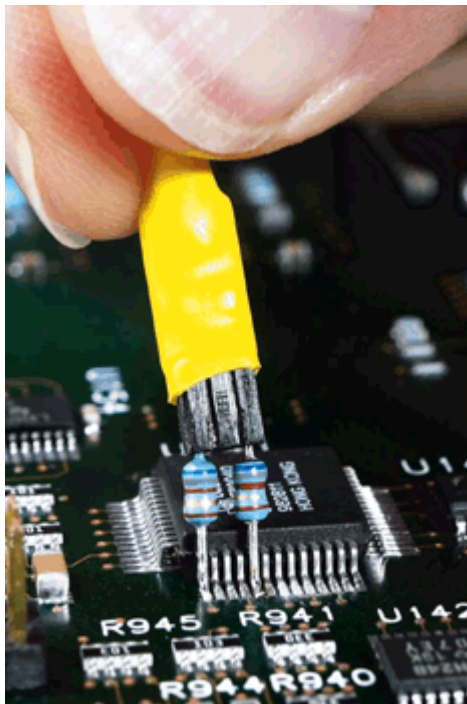
³]p±uµ { @v!b°ð:æÁPçè±ÀªR» ò¶q´ ´ ú@É©Ò, I¹i^{ao}¥t±@Ó°
ÝÃD ; A¹N-O SMT±, ¥ó^{ao} ± ´ ´ ú ; C!P¼É¥H±±^{ao}
Ê±è ; i ± N´ ´ ú, Ö±´ ´ Ý «ð!b±, ¥ó±W-O³Ì±´ ´ £^{ao}§P³N ; C³o¶µ¾P§ @ «Ü§xÃø ; A!Ó¥B¥²¶¶·±
±´ ´ ú±-³s ; A-O¥i!æ^{ao}, Ñ´ ´ M±è@× ; C

!P¶b¹qªy ; j82? ; ^^{ao}¾É½uµð!´ ´ ¾A·f^{ao}ø < × < á ; A§Y¥i´ ´ ; ±J´ ´ B°
Ê¾É½u!y°Ý^{ao} ; @y ; A0±µµÛ!A±N¹qªy²k±µ´ ´ ìPCB±W±^{ao}SMT±, ¥ó ; C³o-
Ó¹qªy¥i¥H±N¥Ø¼D»P´ ´ B°Ê¾É½u!y°Ý´ ´ ; @y^{ao}q@e¹j¶¶
jA´ ´ Ñ¥B!b¥Ø¼D±W´ ´ £´ ´ Ñ¶È0.9 pF^{ao}t, ü ; j´ ´ ´ M©ó´ ´ Ý¹ª^{ao}qªy «~½è ; ^ ; C

±U ; C!i§ÌÁã¥Ü¥H!P¶b¹qªy§ @-°
±-³s^{ao}À³¥i½d´ ´ Ò ; C!b!½d´ ´ Ò±± ; A!P¶b¹qªy³Q²k±µ!b±@Ó52±µ, }^{ao}±è§Ì´ ´ ó, }¥]
j, Ê ; jQFP ; ^^{ao}±µ, }±W ; A³o´ ´ Ç±µ, }!ì!b ; j0.025" ; ^^{ao}±±±±ÁI ; C!P¶b¹qªy¥i±µÄ²-
Ó§O^{ao} «Ê, Ê±µ, } ; A!Ó±£·, ó¶V-Û¾F^{ao}±µ, } ; C



jm¹iãT ; @!P¶b¹qªy^{ao} ; y°Ý¥i±µÄ²Ó§O^{ao} «Ê, Ê±µ, }
jA!Ó±£·, ó¶V-Û¾F^{ao}±µ, } ; jn



³s±µ·î²{¹³ªº ÂP;èÀªR»ö°P@y;]¶Ç²Î«¬;^

³Ì·sªº@t°Ê;¬ B°Ê¾É½u²Õ;A·¬·ÏÏÎ±@Ó±£!P±j±pªº; @y·°Ó§@¬°ÏÏ¹ªºy°Ý, }@y;A³o-
Ó; @y·£·Ñ±F¶q´ú, û±jÀW¼eªº- à±O; CµM!Ó²{¹³ªº@¬·Ç³]p¬O!bPCB±W!w, m¶Ç²Îªº; @y°P@y;AÏH·f°t¶Ç²Î«¬ B°
Ê¾É½u´ú, Õ±´´Î·ÏÏÎ; A³º@ÉÏi§QÏÏ¾A·ªººtÏ±NÂª«¬±µ, }ªºª½@|;]0.025" ; ^; AÂàª«¬i·¬·@t°Ê;¬ B°
Ê¾É½u´ú, Õ±´´Î; @yªº·sª½@|;]0.020" ; ^; C(¹ÏÏ)ÂªÏÏÛ±@Ó·ÏÏÎ; @yÂà±µ¾¹°
tÏ±ªº½d·¬; C¹Ï±ªªªÏÏÛ!p!ó±N´; @yÂà±µ¾¹´; ±J¬ B°
Ê¾É½uªººy°Ý; @y; F³º·Çªª±µ¾¹±µµÛÏÏÏH@M¶iÏÏ¼Ð±Wªº0.025" ±µ, }; C´N¹q@ð¬ S@Ê!Ó·ÏÏ; A³º¶µ³s±µ;]Ï§t-
ì·°ªº0.025" ±µ, }; ^!bÏÏ¼Ð±W´£·Ñ¶È1.1 pFªºµÏ®Ä¹q@et, ü; C

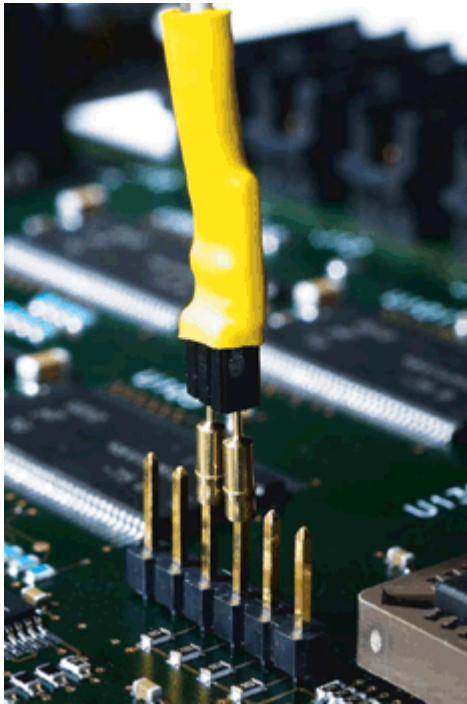
³±±@, `ÂI´ú, Õªº³]p

@t°Ê;¬ B°Ê¾É½u²Õ±µÏÏÏÏ·Ó±´´ú³]-
p!nªº«H, ¹; A!p!·ÏÏÎªª«KÏÏÏH!bPCBÏ@P³]-
p³±±@, `ÂIªº´ú, ÕÂI; A§@ªk¬O·ÏÏÎ@t°Ê;¬ B°
Ê¾É½u²Õªººy°Ý; @yÏÏ¹ªº±µ®M±Jªº±T±µ, }°P@y; C

±T±µ, }°P@yÏDn·í§@¶Ç²ÎªºSMT±µÀY·ÏÏÎ; A³ºo-
Ó±µÀYÏÏ; m@óÏÏ¼ÐPCBªº±£!P!ì, m; C@t°Ê;¬ B°
Ê¾É½uÏÏ¹ªº±µ®M±J°P@y; C!b¾±±ñ¬ S@Ê±W; A±T±µ, }
°P@y·£·Ñ±F±ñ²k±µ±èªk§ó¬°ÏÏ¾ªªº³s±µ; A!P@É±]
´£·Ñ!bÏÏ¼Ð±W¼sªx´²§G±´´úÂIªº¼u@Ê; C(¹ÏÏ)ÂªÏÏÛ·ÏÏÎ±T±µ, }
°P@yªº½d·¬; C¹Ï±ªªªÏÏÛ, m@óÏÏ¼ÐPCB±Wªº±T±µ, }°P@y±Ï±´
wÀY³s±µªº±è; ; A³Ìªª«Á·ÏÏÏ³s±µ; C´N¹q@ð¬ S@Ê!Ó·ÏÏ; A±T±µ, }°P@y°tÏ±;]
Ï§tªª±±ÂHµÛªª·ÄY±µ±; ^!bÏÏ¼Ð±W´£·Ñ¶È1.0 pFªºµÏ®Ä¹q@et, ü; C

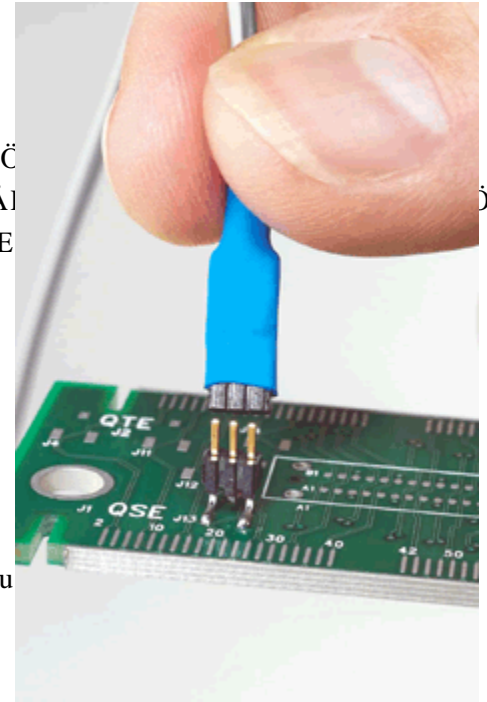
¶m¹ÏÏ; @´; @y; Âà±µ¾¹³s±µ;]Ï§t-
ì·°ªº0.025" ±µ, }; ^; A!bÏÏ¼Ð±W´£·Ñ¶È1.1
pFªºµÏ®Ä¹q@et, ü; C

µ²»y



ÅPçèæÀªR-Ōα@-
 Ó±jæjªºαu·ã;A- à¨ó§U¼Æì³]pαuμ
 { @v°
 ò!æ¨²t²ÎÁçÃÒæÍÁYμu²£«~æW¥«®Éμ
 { ;AμM!Ó-
 YμLªk«Øÿß»P«Ý´ú¨²Î¶;ªºÿi¾a³s±μ;A¾Ç
 -ŌªPμM;CÿHŌ¹·í«H,¹μLªk¶Ç¨ì¼Ð·ÇªºÁ
 ¶q´úŌŌ»Ý;A³q±¨ÿi³z¹L,ÀW¼e³s±μ¨ÓÆ
 [¹í«H,¹;A;ý¶q´úªº³t«×·|¨¨¨-
 ¨¨;C;pªG§¹ÿpμLªkÆ
 [¹í«H,¹;A¨ÍÿÍ¹´Nÿu¨à°
 ò!æ³;ÿ÷ªº¶q´ú;C!b³Ì·sªº®t°Ê!;B°
 Ê¾É½u´ú,Ö±´Í°ÿÿ@æ§«á;AæW-
 zŌ!³ºÝÃD§;ÿiªªb!Ó,Ñ;C²
 { !bÅPçèæÀªR»öªº¨¨ÿÿÍ¹¹±N¾Ö!³æ@-
 Ó³ÌæjÀW¼eªº±´´ú,Ñ¨Mæè®×;A¨¨á´£¨Ñ¼u
 pαuμ { @v!Aæ]

j;m¹jæ;@æT±μ,)
 °P®y³s±μ;A!bÿØ¼ÐæW´£¨Ñ¶È1.0
 pFªºμÿ®Á¹q®et,ü;n



æ£ÿ²¾áæß³s±μ³QŌ;²æªº«H,¹;AÿHæÍ°w¹j³o¨Ç«H,¹°ò!æ³ÌæjÀW¼e¶q´úªºº
 ÝÃDæF;C;]§ @ªÿÿδÂ¾ŌŌ!w±¶Û¨¨ì§P;^



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