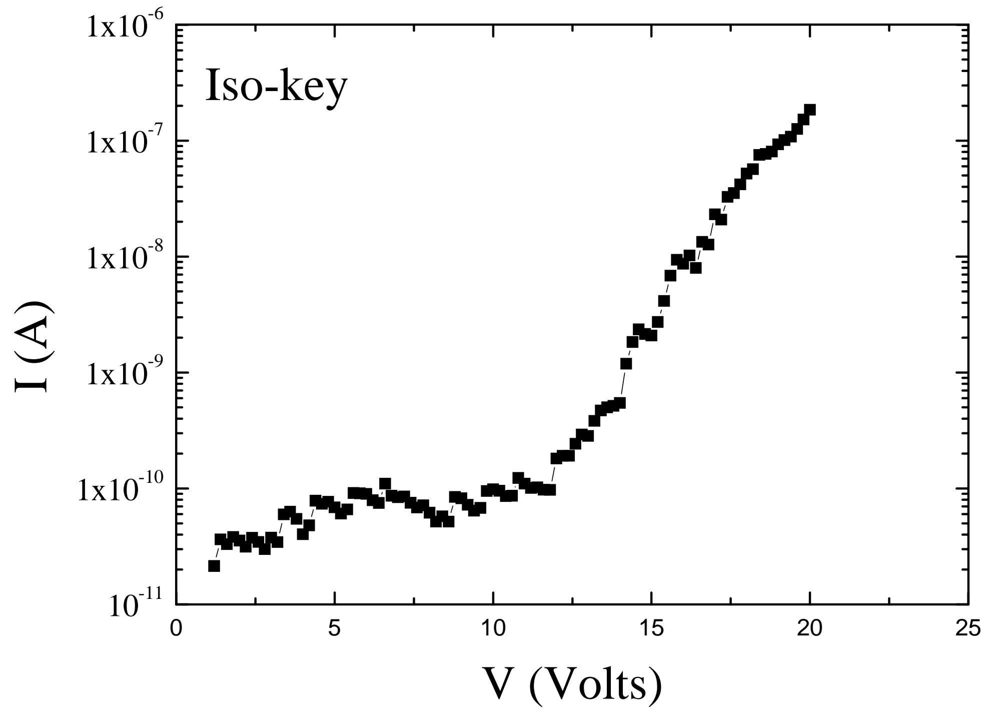
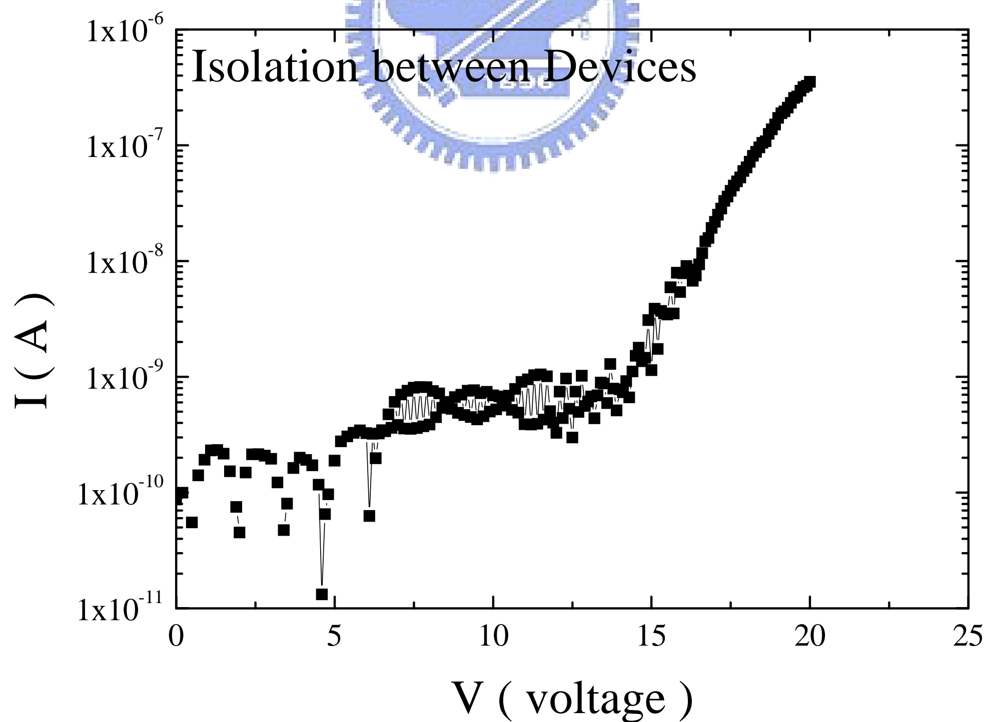


(a)



(b)

Figure 5-1. The leakage currents in (a) Iso-key and (b) between the adjacent devices at room temperature.

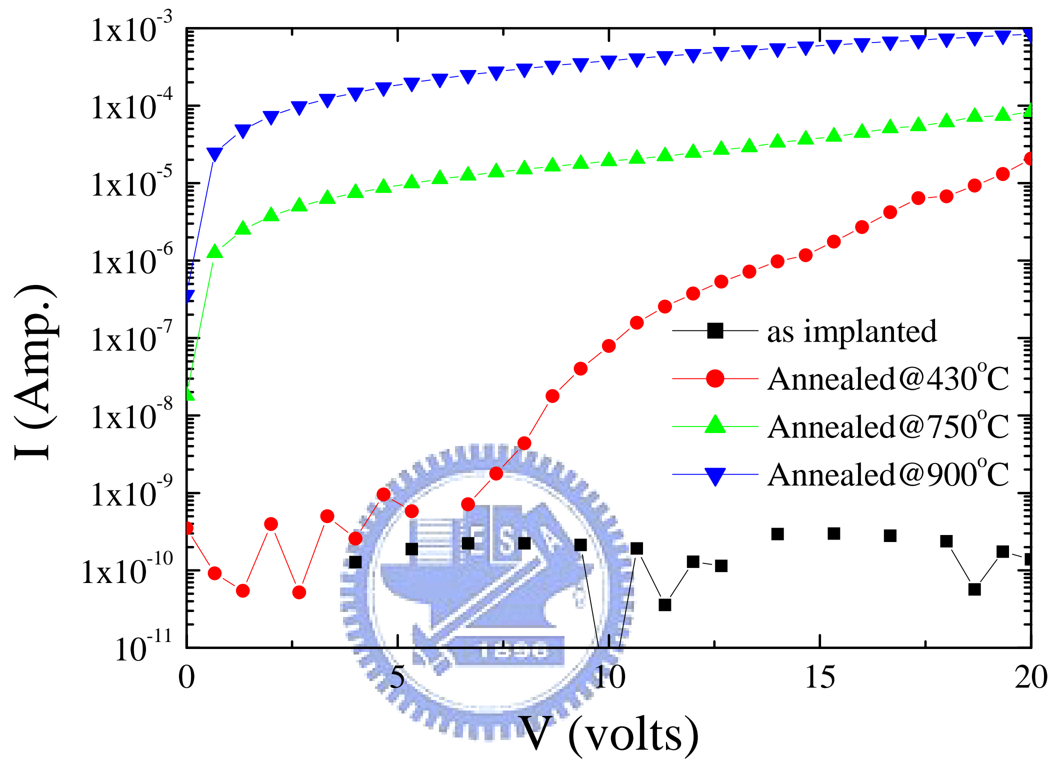


Figure 5-2. The leakage currents of implanted isolation at different annealing temperatures.

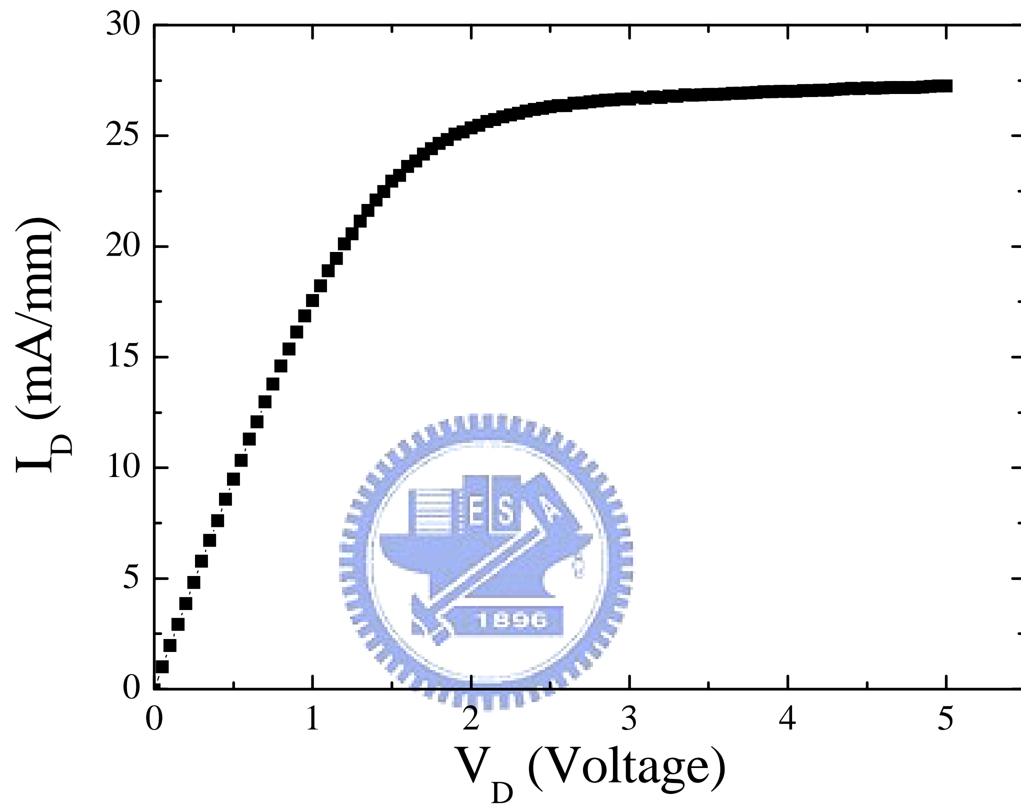
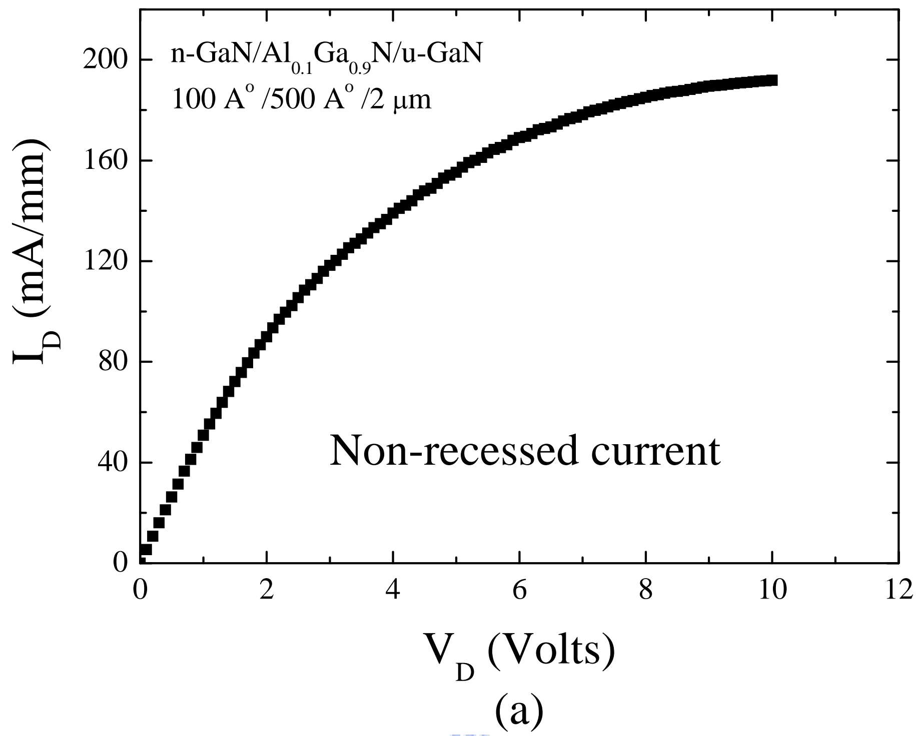
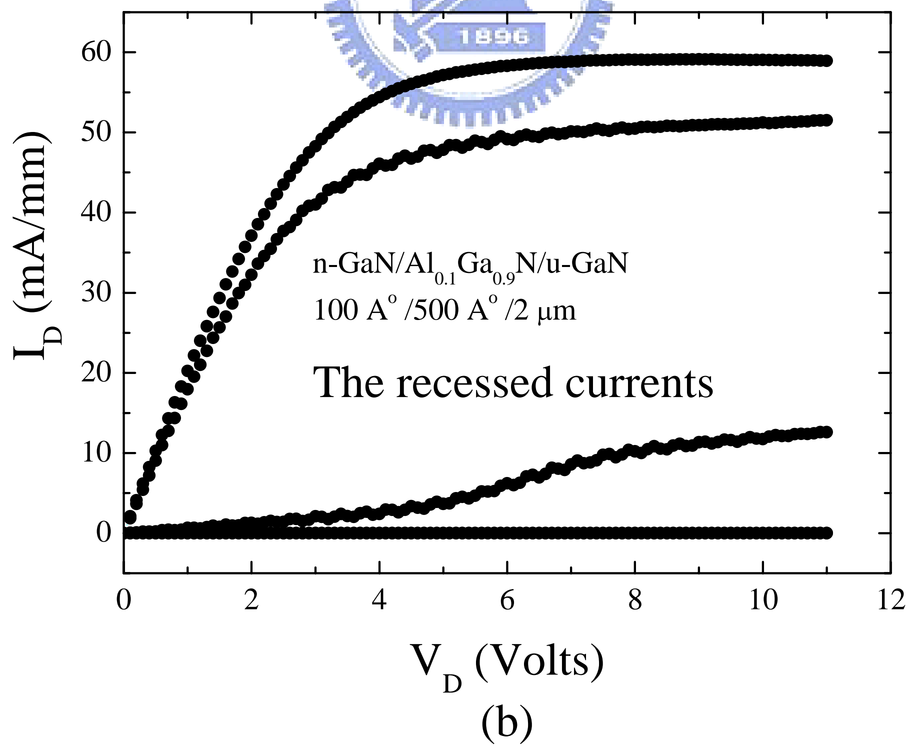


Figure 5-3. The I-V curve of an 500Å $Al_{0.15}Ga_{0.85}N$/ 2μm u-GaN HEMT structure just after Ti/Al/Pt/Au Ohmic contact.

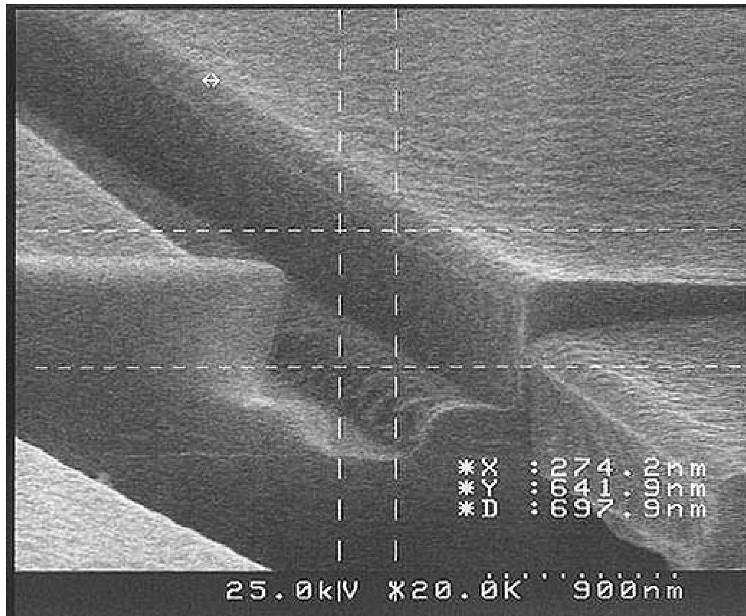


(a)

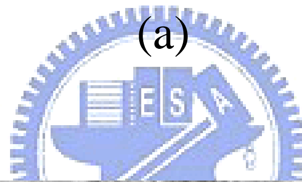


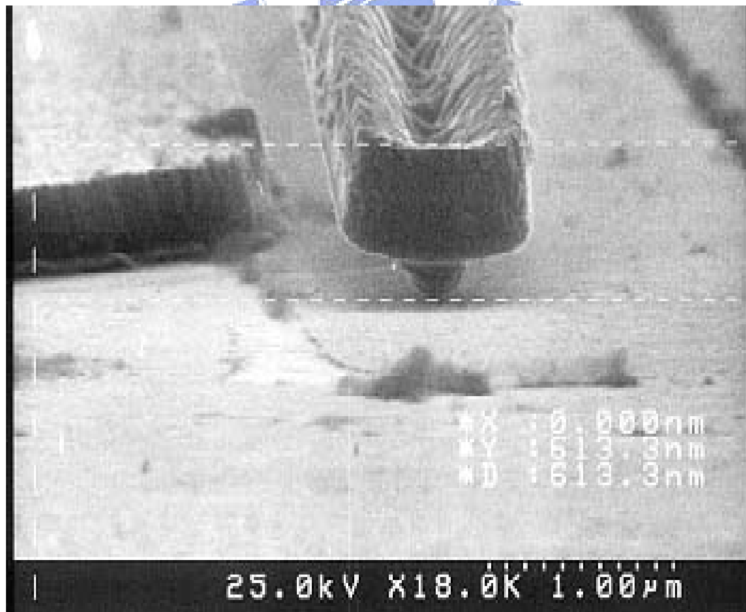
(b)

Figure 5-4. The I-V curve before Schottky contact of n-GaN capped $Al_{0.1}Ga_{0.9}N$/u-GaN HEMT for (a) un-recessed and (b) recessed at gate region.



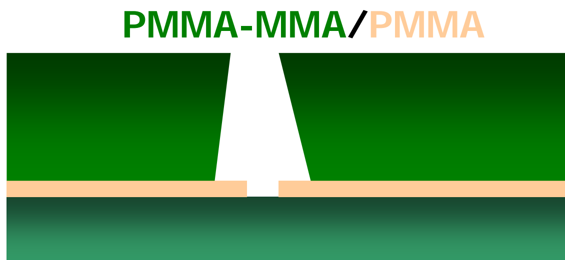
(a)

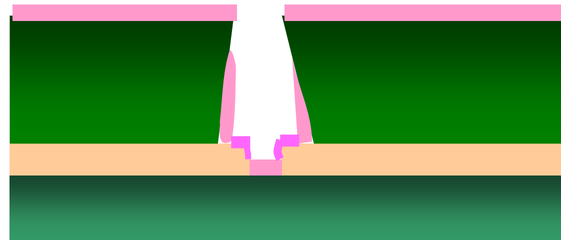


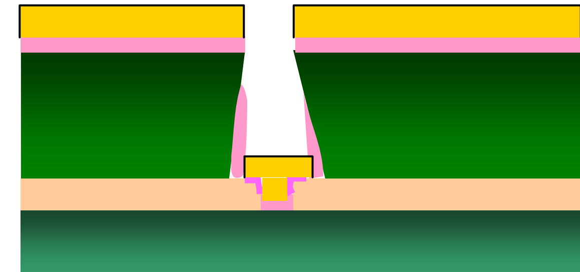


(b)

Figure 5-5 SEM pictures of Ni/Au T-gate







Step 1:

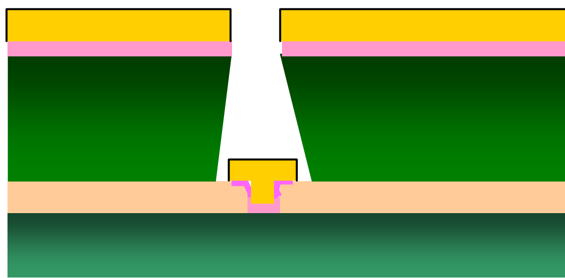
E-beam writer 0.3μm T-gate shape

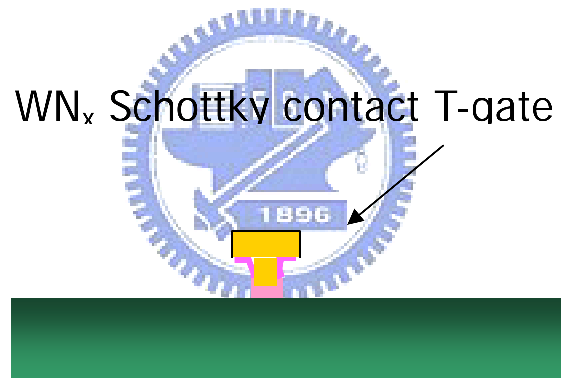
Step 2:

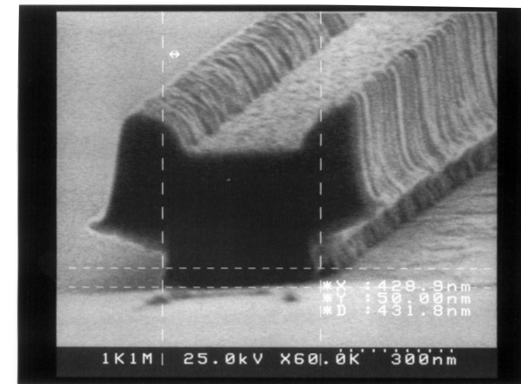
Deposition of 500Å of WN_x by sputtering

Step 3:

Ti/Au (200/5000Å) deposition







Step 4:

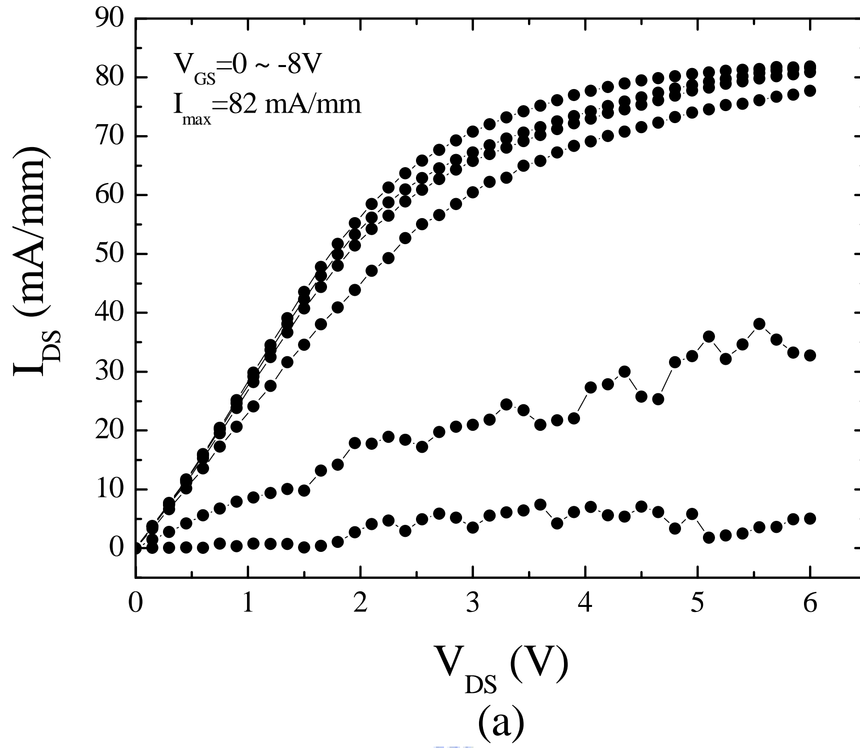
PR lift-off

WN_x film etched by RIE @70 mtorr

RF power 50W for 3.5 min

Gas flow rate:CF_4/O_2=50/ 30 sccm

Figure 5-6. Process flow and SEM picture of TiW_n T-gate



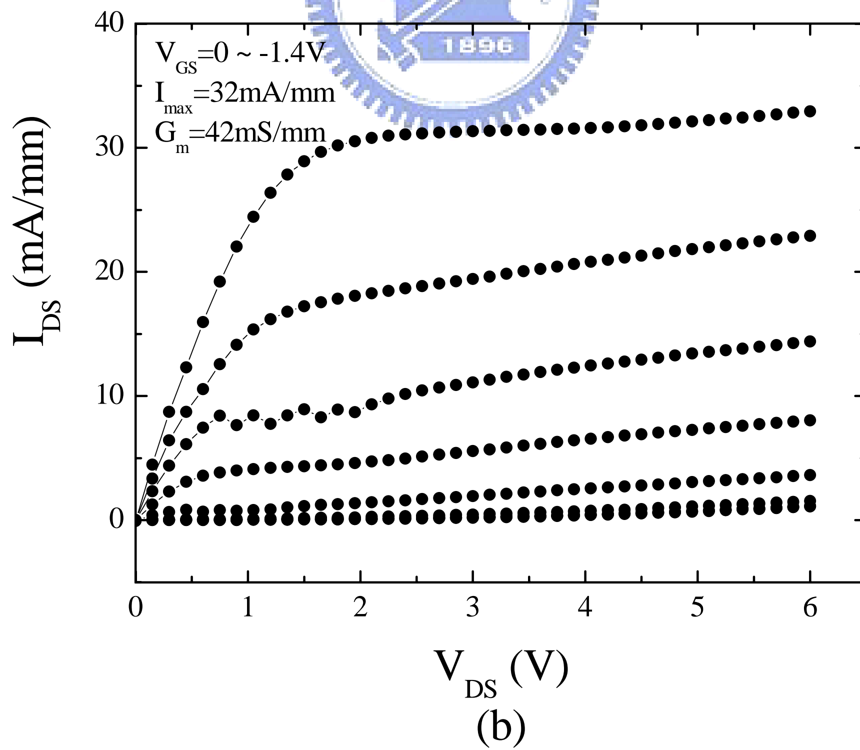


Figure 5-7. The I-V curves of n-GaN capped $Al_{0.1}Ga_{0.9}N$/u-GaN HEMTs in cases of (a) incomplete removal and (b) complete removal of n-GaN cap.

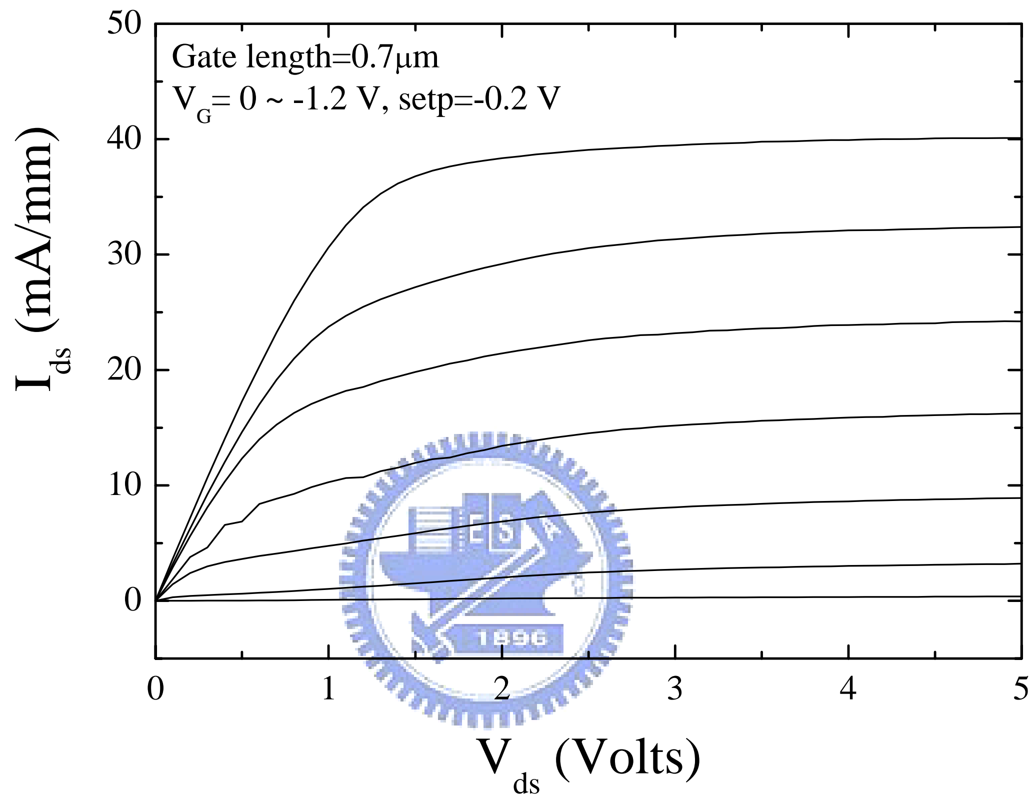
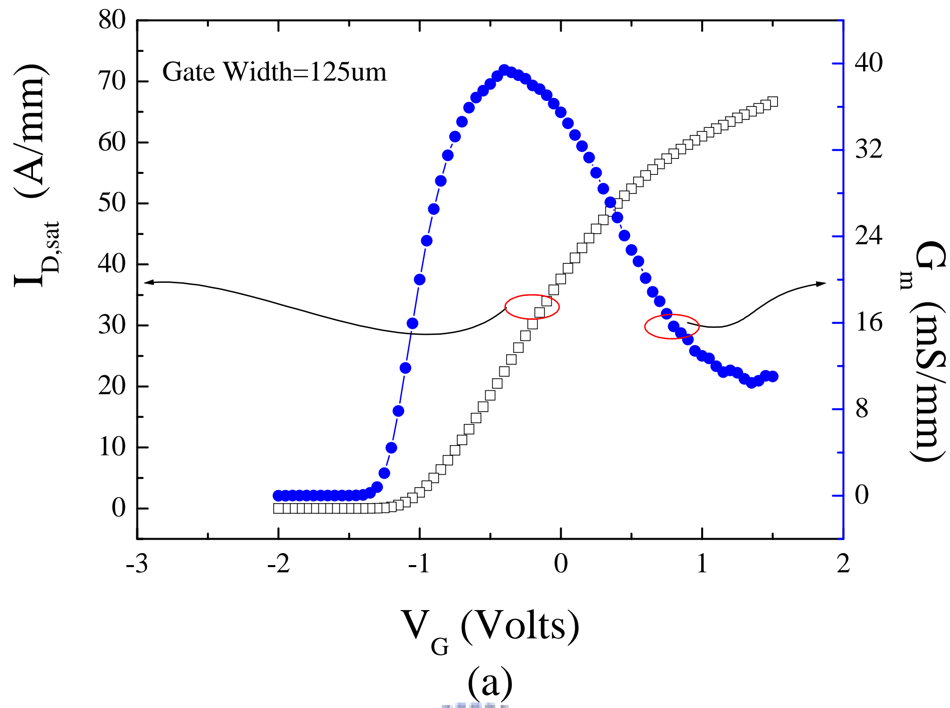


Figure 5-8. The DC characteristics of a WN_x gate AlGaN/GaN HEMT measured at room temperature.



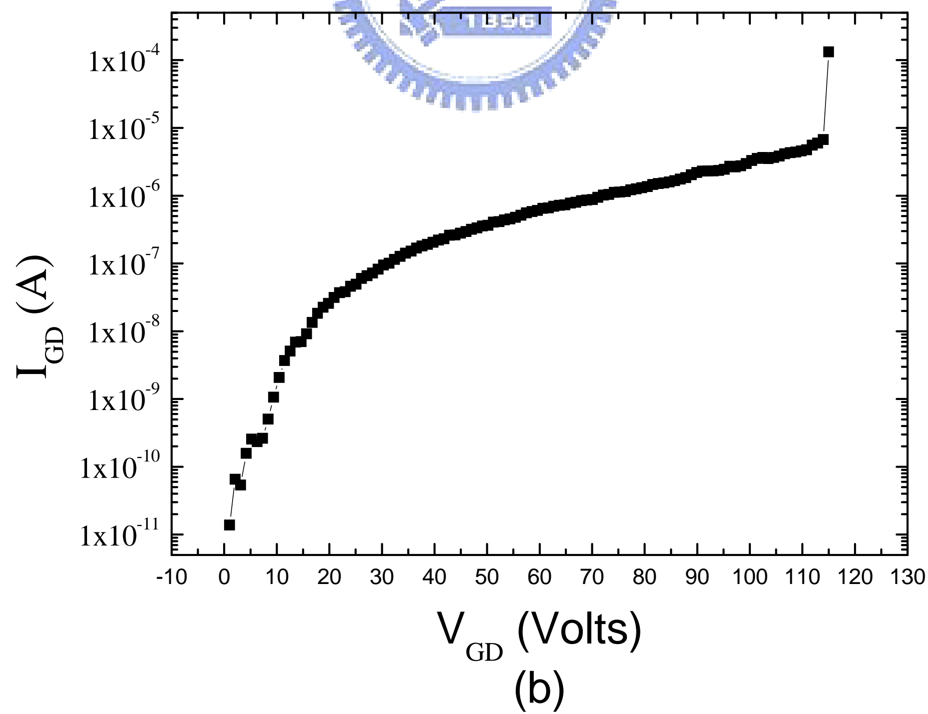


Figure 5-9. (a) The transconductance at different gate voltages and (b) leakage current across the gate and drain.

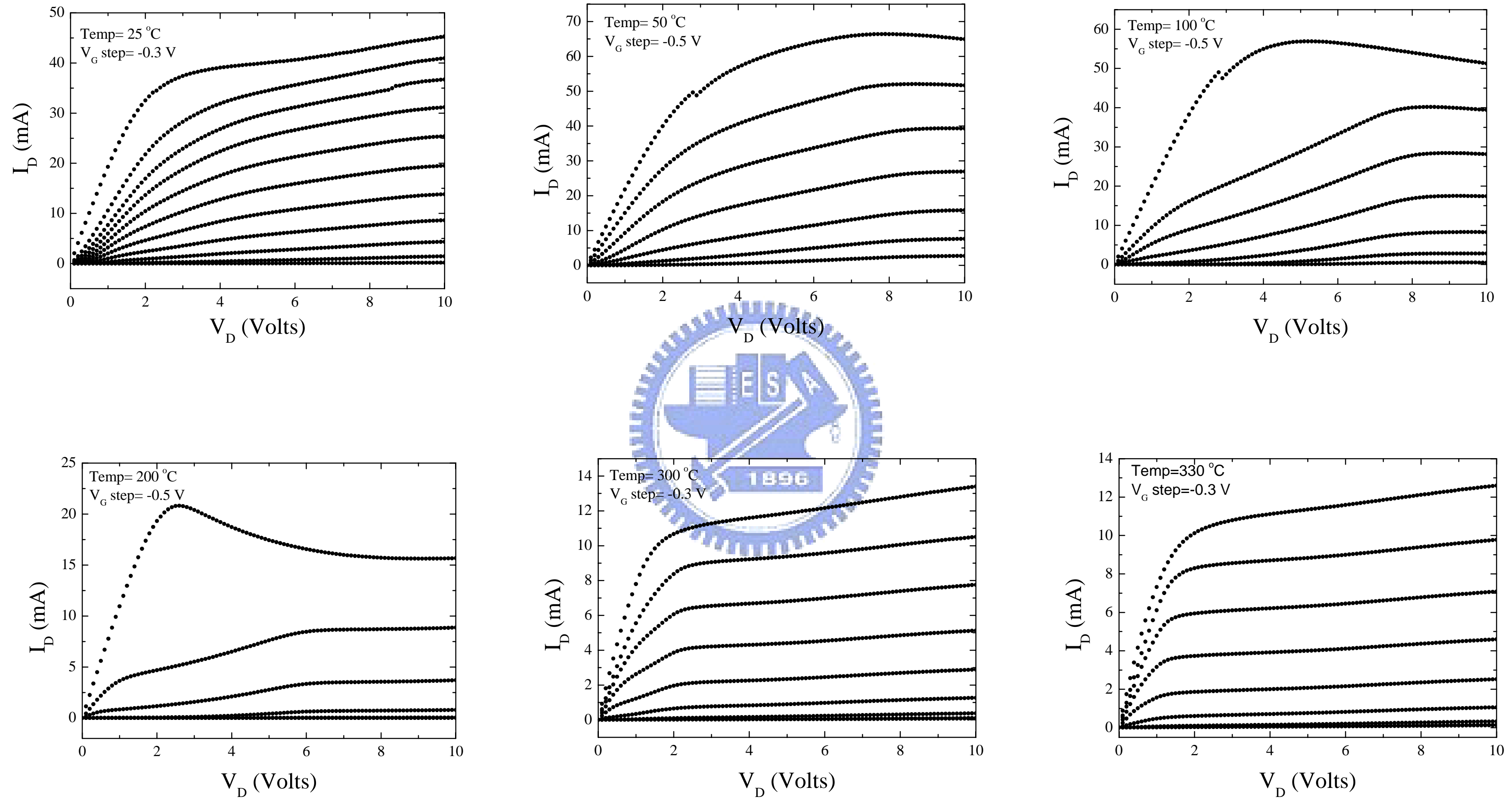
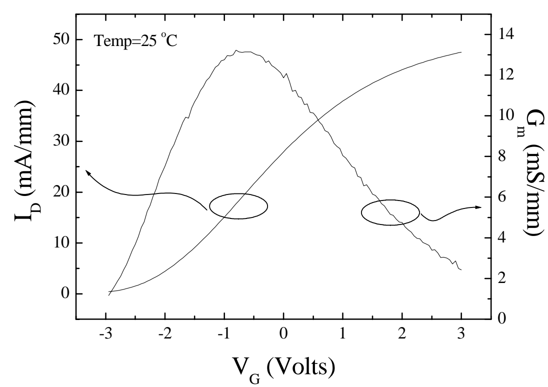
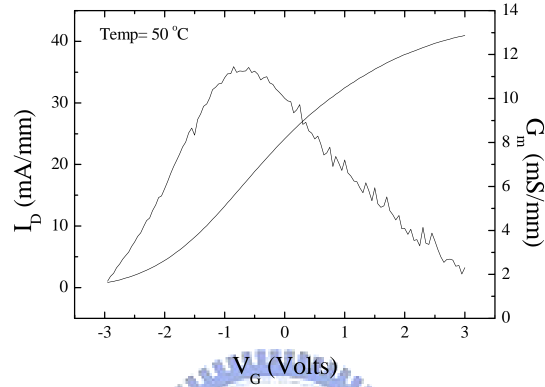
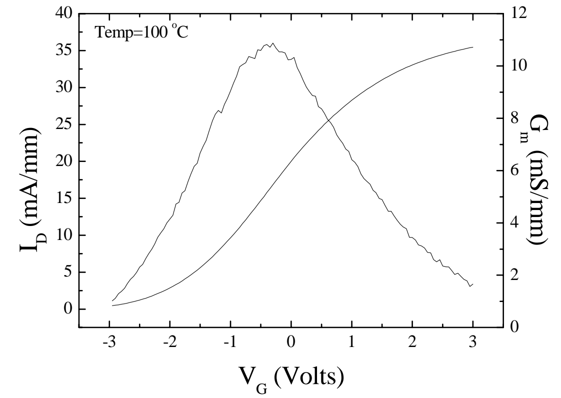
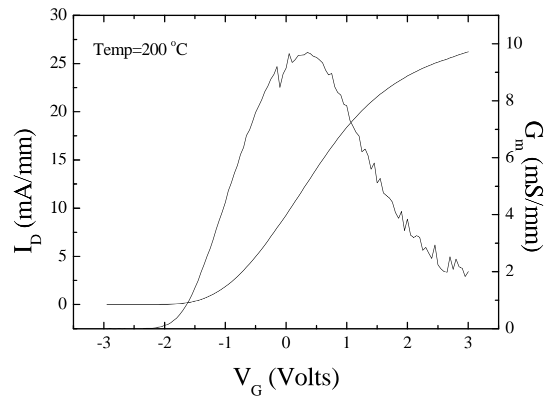


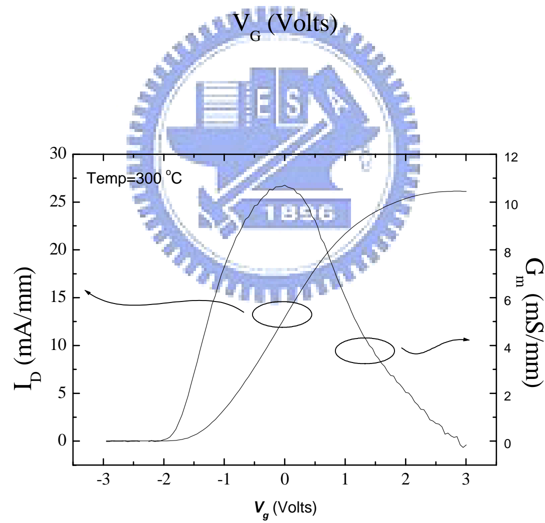
Figure 5-10 The *I-V* curves of the WN_x T-gate AlGaN/GaN HEMT measured at different temperatures.











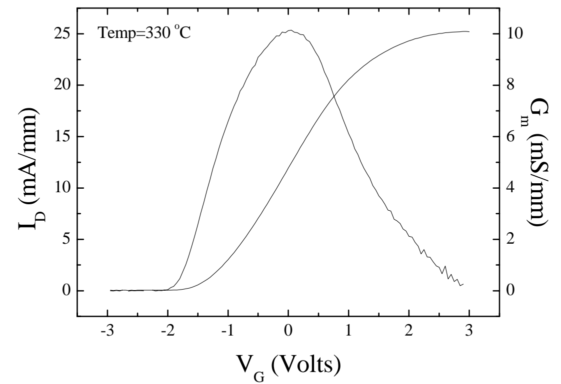


Figure 5-11. The transconductances of the WN_x T-gate AlGaN/GaN HEMT measured at different temperatures.

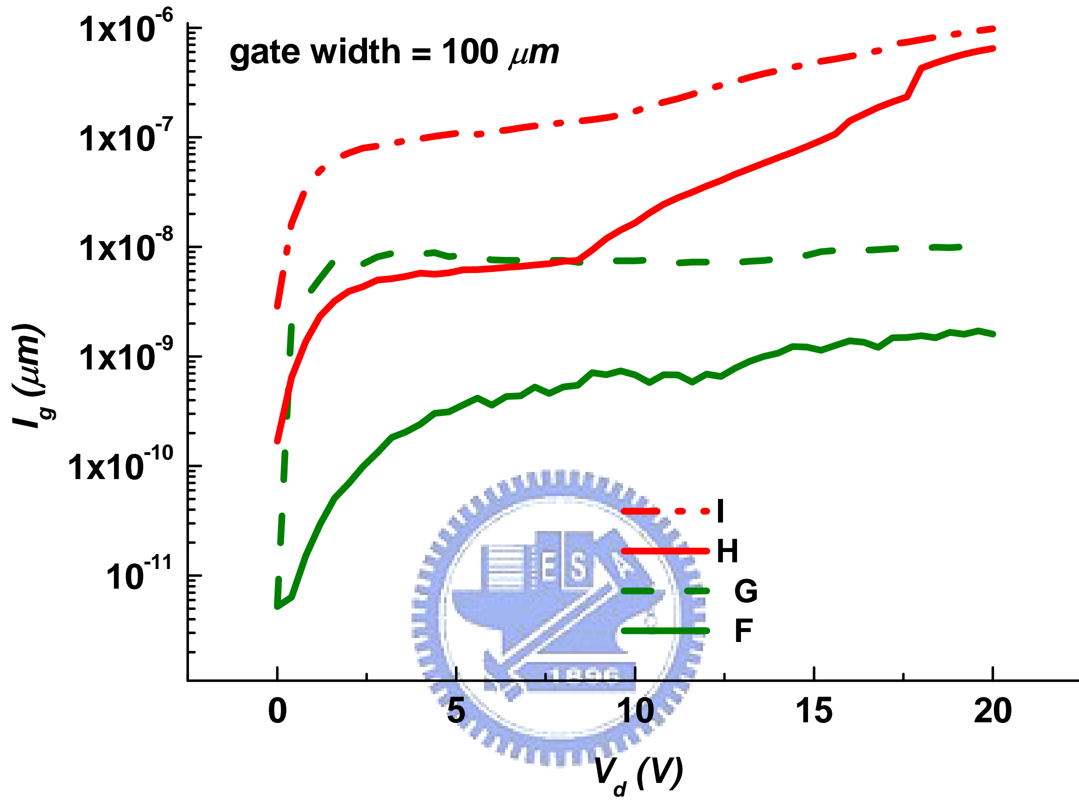
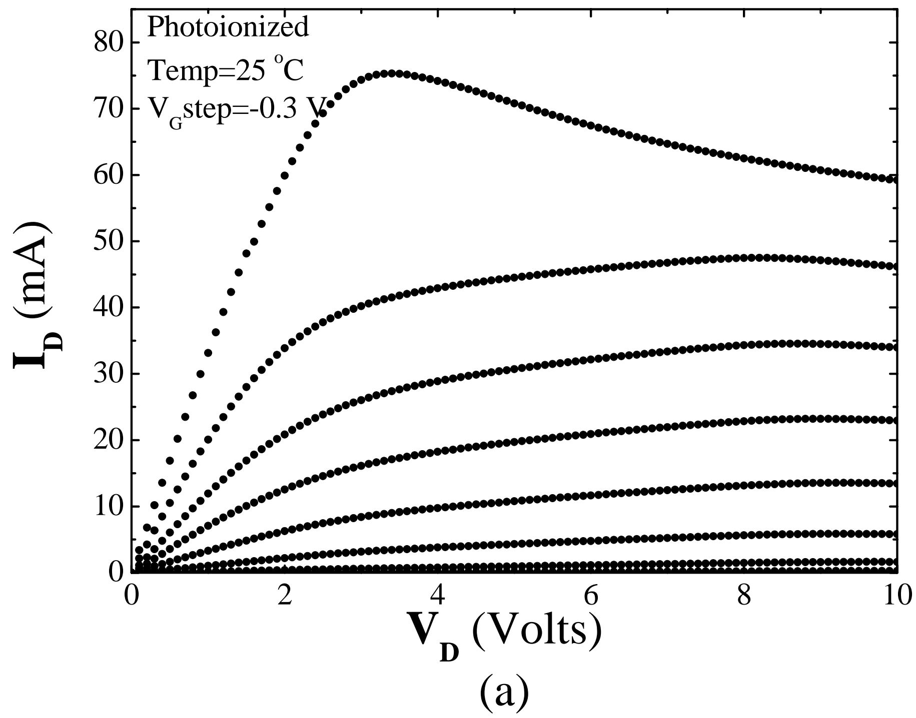
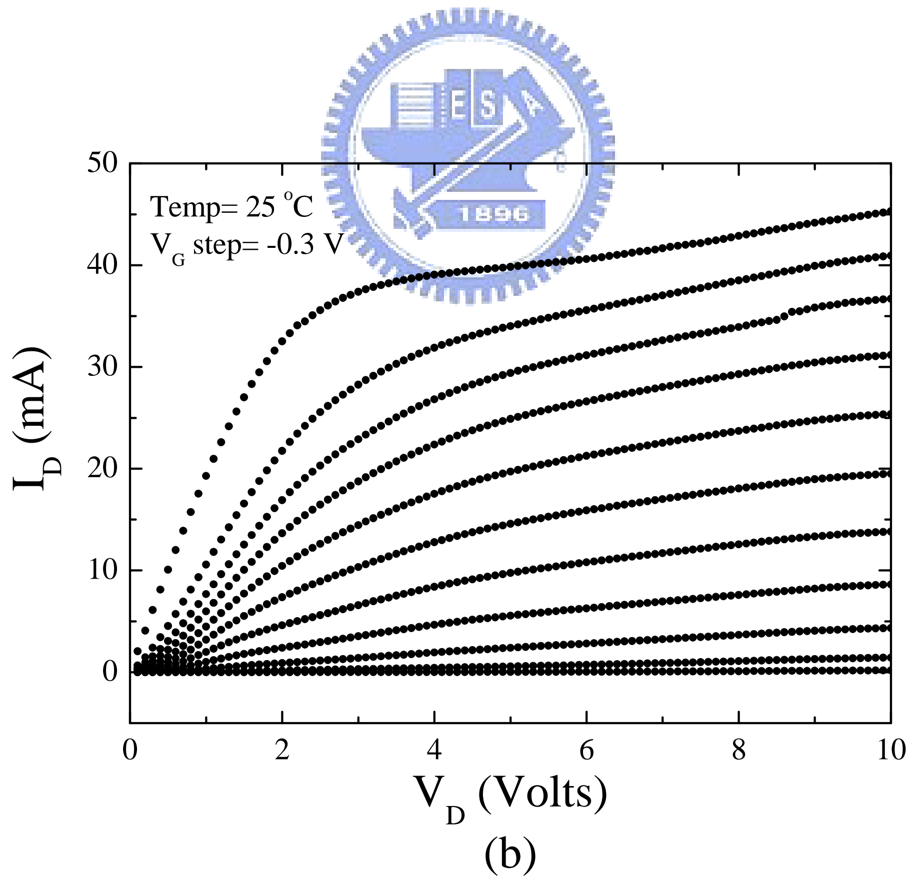


Figure 5-12. The leakage currents across the gate and drain for different metal gates at different operation temperatures.



(a)



(b)

Figure 5-13. WNx T-gate AlGaN/GaN HEMTs measured (a) with light exposure, and (b) without light exposure.