TI DSP, MCU / Xilinx Zynq FPGA 프로그래밍 전문가 과정

(LM2576 Buck Regulator Altium Design Procedure)

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Construction

LM2576 소자선정 후 Datasheet의 Application Information을 참고하였다.
http://www.ti.com/lit/ds/symlink/lm2576.pdf

LM2576xx Series SIMPLE SWITCHER® 3-A Step-Down Voltage Regulator

1 Features

- 3.3-V, 5-V, 12-V, 15-V, and Adjustable Output Versions
- Adjustable Version Output Voltage Range,1.23 V to 37 V (57 V for HV Version) ±4% Maximum Over Line and Load Conditions
- Specified 3-A Output Current
- Wide Input Voltage Range: 40 V Up to 60 V for HV Version
- Requires Only 4 External Components
- 52-kHz Fixed-Frequency Internal Oscillator
- TTL-Shutdown Capability, Low-Power Standby Mode
- High Efficiency
- Uses Readily Available Standard Inductors
- Create a Custom Design with WEBENCH Tools
- Thermal Shutdown and Current Limit Protection

2 Applications

- Simple High-Efficiency Step-Down (Buck) Regulator
- Efficient Preregulator for Linear Regulators
- On-Card Switching Regulators
- Positive-to-Negative Converter (Buck-Boost)

3 Description

The LM2576 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving 3-A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3 V, 5 V, 12 V, 15 V, and an adjustable output version.

Requiring a minimum number of external components, these regulators are simple to use and include fault protection and a fixed-frequency oscillator.

The LM2576 series offers a high-efficiency replacement for popular three-terminal linear regulators. It substantially reduces the size of the heat sink, and in some cases no heat sink is required.

A standard series of inductors optimized for use with the LM2576 are available from several different manufacturers. This feature greatly simplifies the design of switch-mode power supplies.

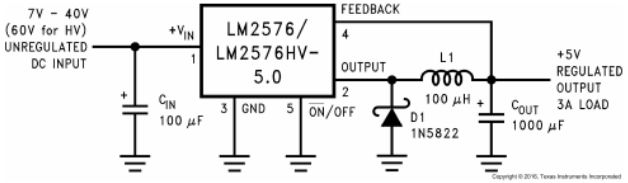
Other features include a ±4% tolerance on output voltage within specified input voltages and output load conditions, and ±10% on the oscillator frequency. External shutdown is included, featuring 50-μA (typical) standby current. The output switch includes cycle-by-cycle current limiting, as well as thermal shutdown for full protection under fault conditions.

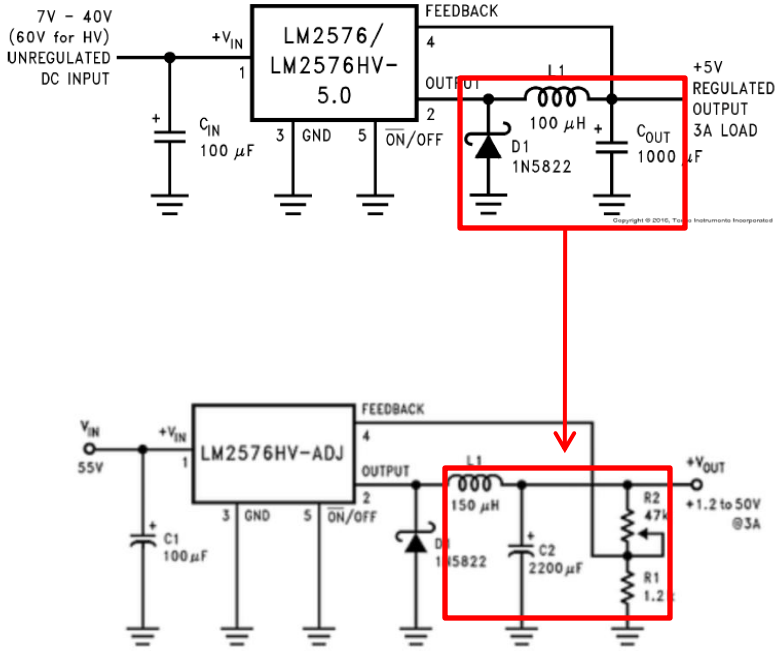
Device Information(1)

PART NUMBER	PACKAGE	BODY SIZE (NOM)
LM2576 LM2576HV	TO-220 (5)	10.16 mm × 8.51 mm
	DDPAK/TO-263 (5)	10.16 mm × 8.42 mm

(1) For all available packages, see the orderable addendum at the end of the data sheet.

Fixed Output Voltage Version Typical Application Diagram

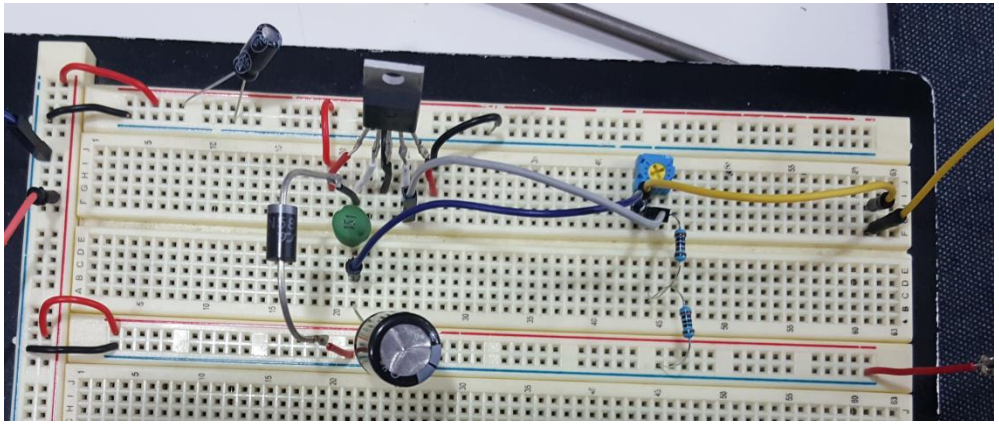


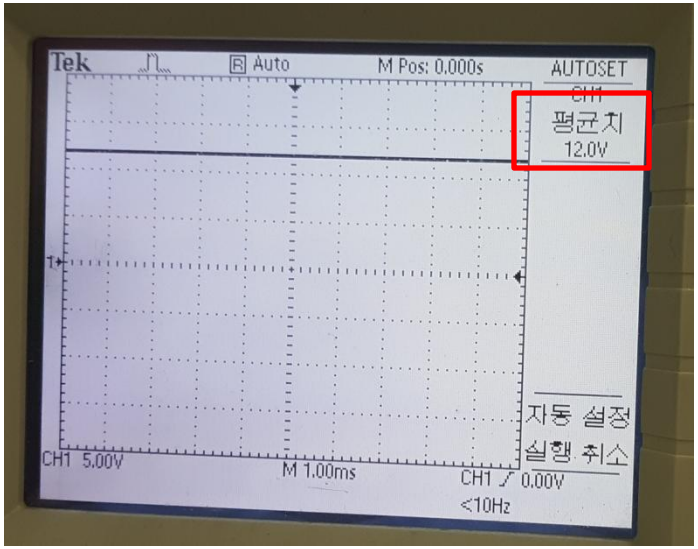


Bill Of Materials (Simple)

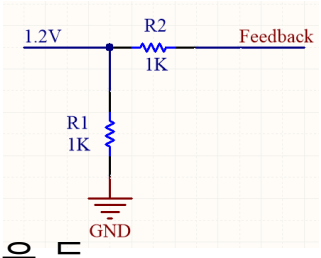
A	B	C	D	E	F
순번	명칭	개수	Package	URL	가격
1	**LM2596T-ADJ**	1	TO-220-5	http://m.eleparts.co.kr/goods/view?no=52686	₩ 7,420
2	**AL-CAP 2200uF 16V 105도**	1	Radial	http://m.eleparts.co.kr/goods/view?no=3369512	₩ 280
3	**CAP ALUM 100uF 20% 25V 105도**	1	Radial	http://m.eleparts.co.kr/goods/view?no=1037437	₩ 391
4	**DIODE, 1N5822, SCHOTTKY, 3A, 40V**	1	DO-201	http://m.eleparts.co.kr/goods/view?no=638020	₩ 564
5	**INDUCTOR, 150UH, 0.28A, 10%**	1	Radial	http://m.eleparts.co.kr/goods/view?no=2953968	₩ 386
6	**CT-6P 50kΩ Square Trimming Potentiometer**	1	Radial	http://m.eleparts.co.kr/goods/view?no=12660	₩ 320
7	Res Metal Film 1K Ohm 1% 0.25W(1/4W)	1		http://m.eleparts.co.kr/goods/view?no=1059877	₩ 124
8	Res Metal Film 200 Ohm 1% 0.25W(1/4W)	1			

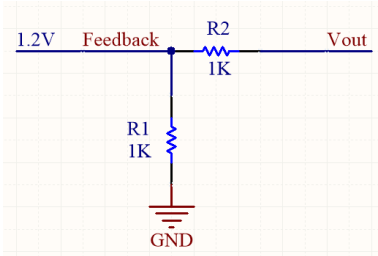
Operation Test





LM2576 Specification

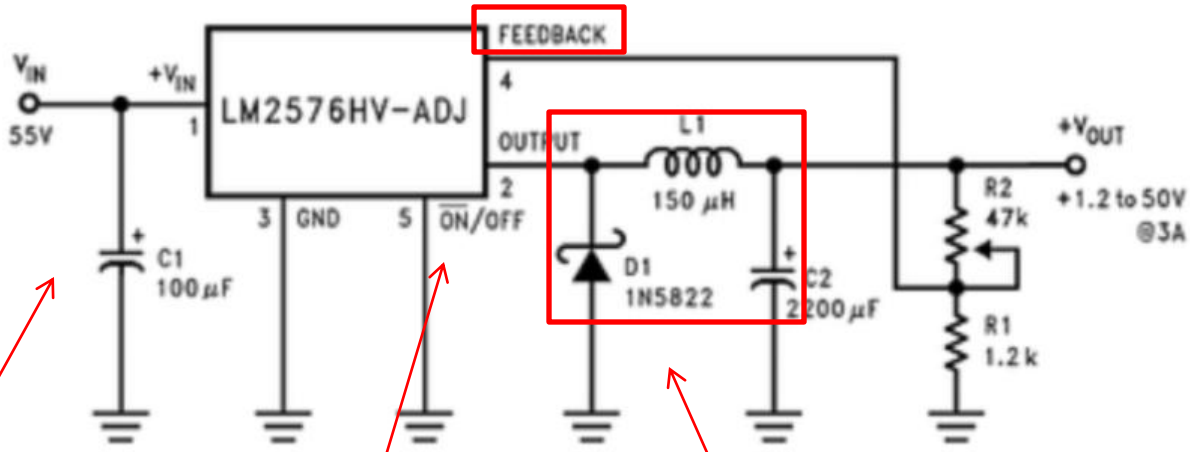




가장 낮은 19.8V에서
12V출력이 나오도록 가변저항을 조절한다
리플이 0.1V 정도 나오는데
DSP는 허용 리플이 0.2V이므로 사용할 수 있을 듯

FB pin : 내부에 전압분배용 저항 2개 위치
(LM2576 adj는 외부에 저항 위치)

Up to 40V
(LM2576_HV : Up to 60V)

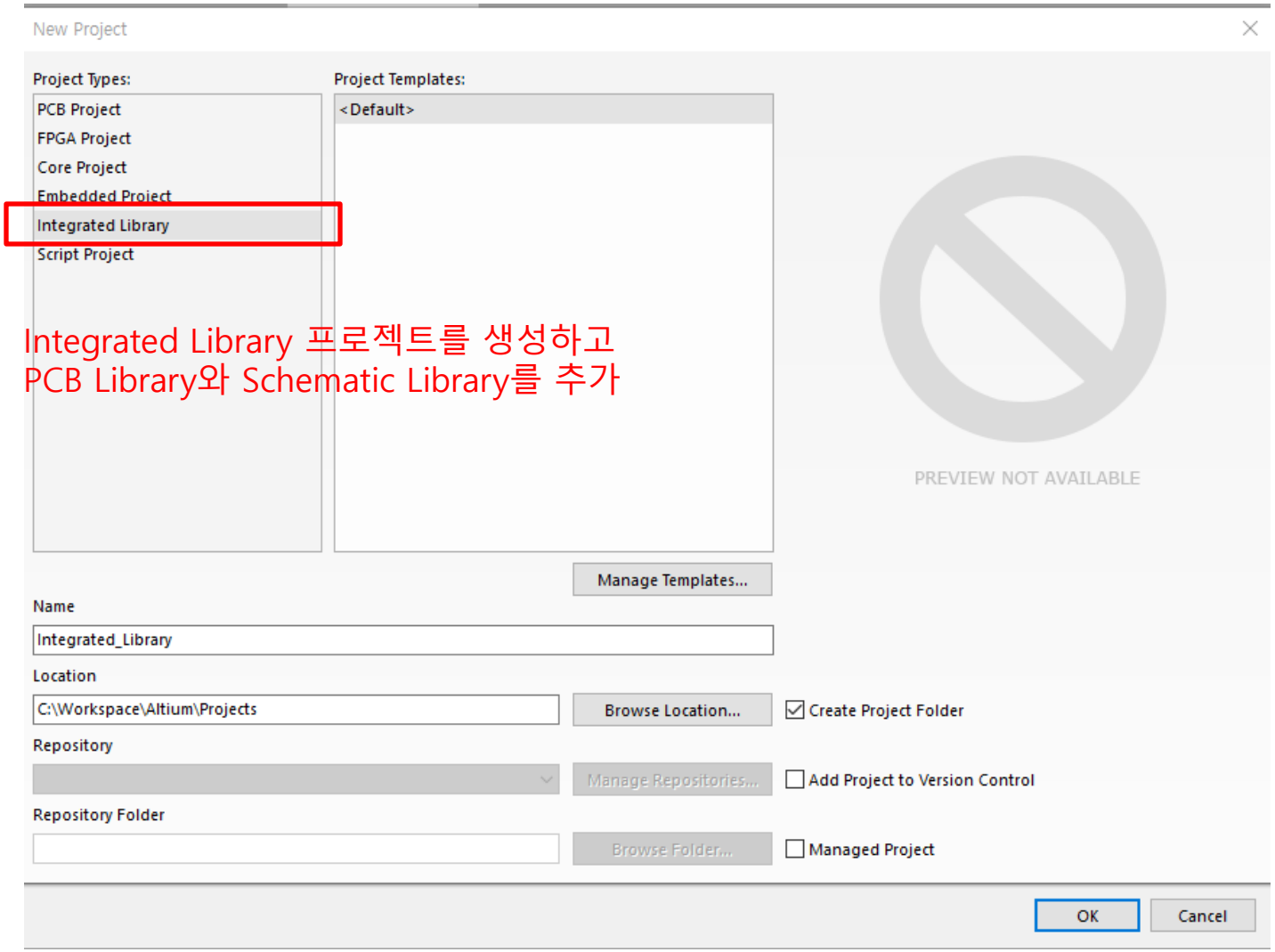


Bypass Capacitor
(for Filtering)

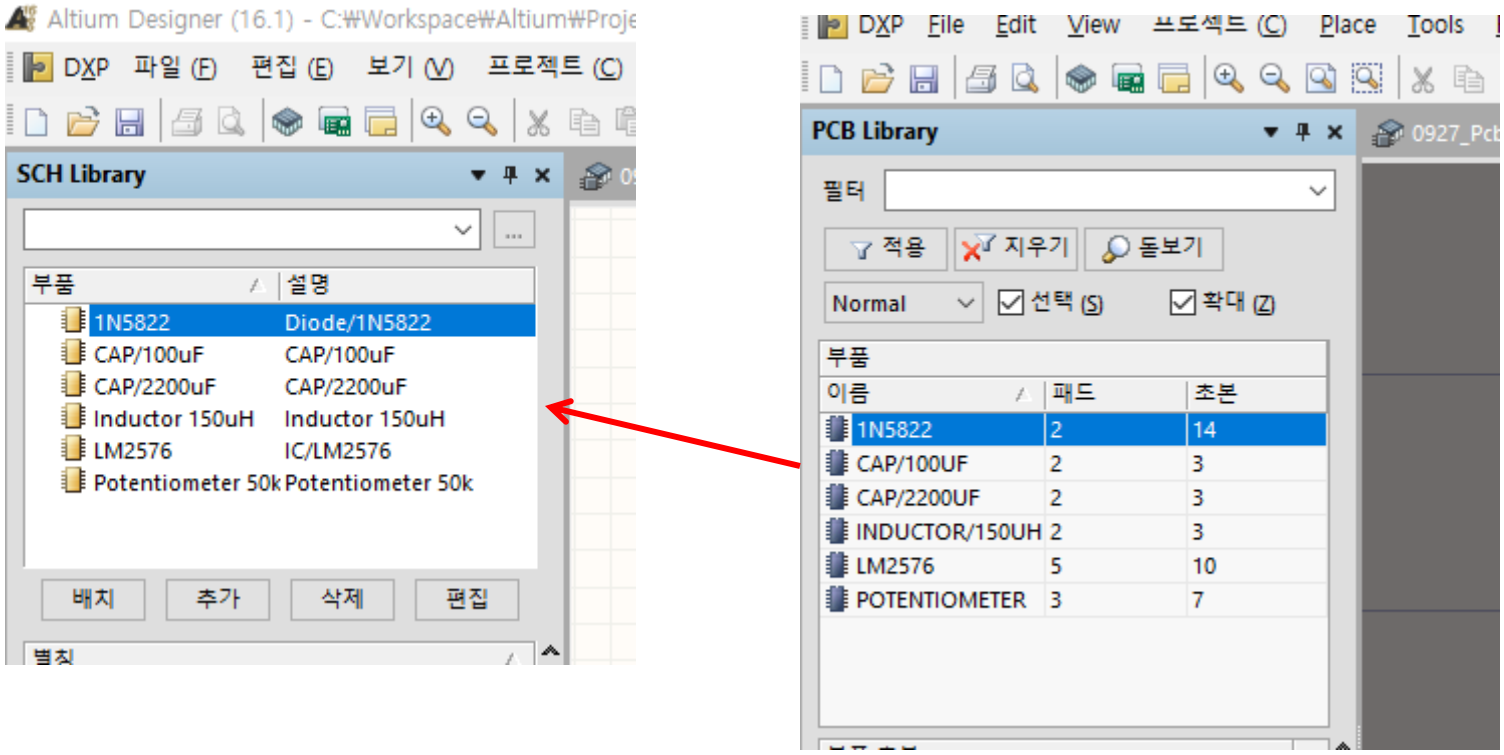
Regulator On all the time

Switch Regulator 약 50kHz로 동작
(IC 내부 오실레이터에 의한)

Altium Design Procedure – Integrated Library

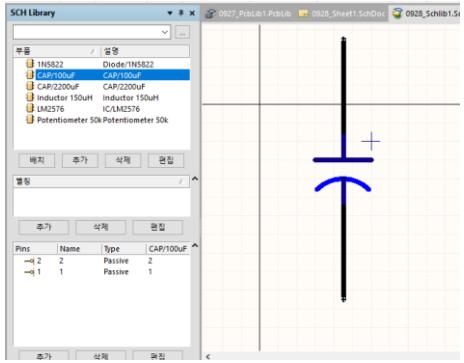


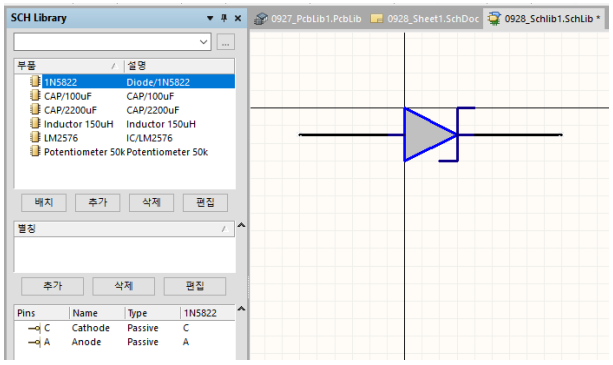
Altium Design Procedure

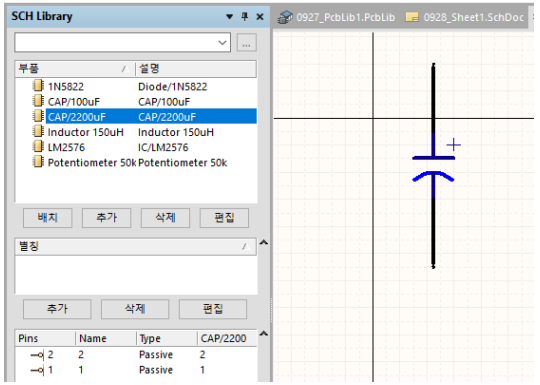


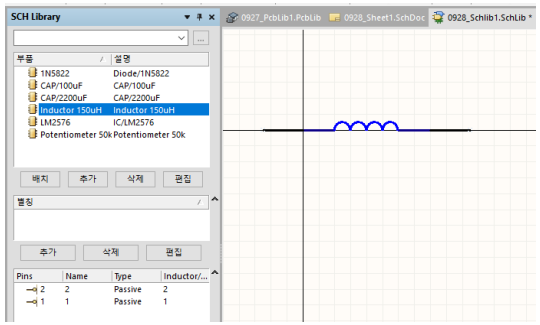
Schematic , PCB Footprint 작성하고 작성된 Schematic Library에 Add Footprint

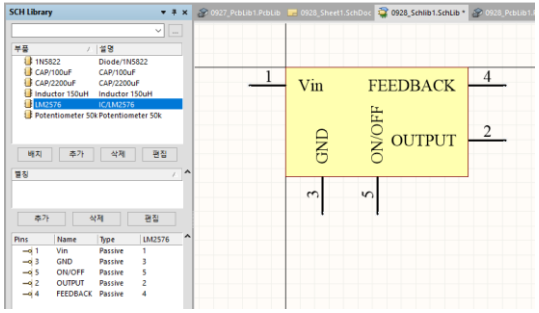
Altium Design Procedure - Schematic Library

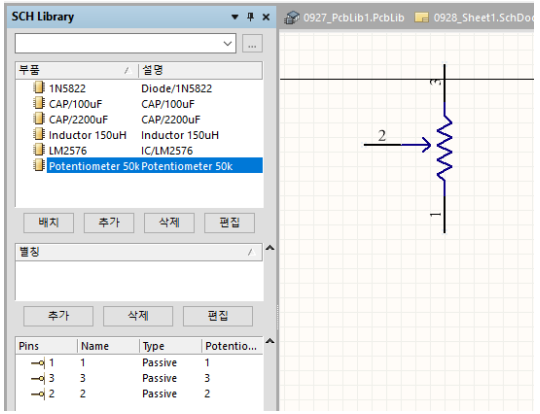




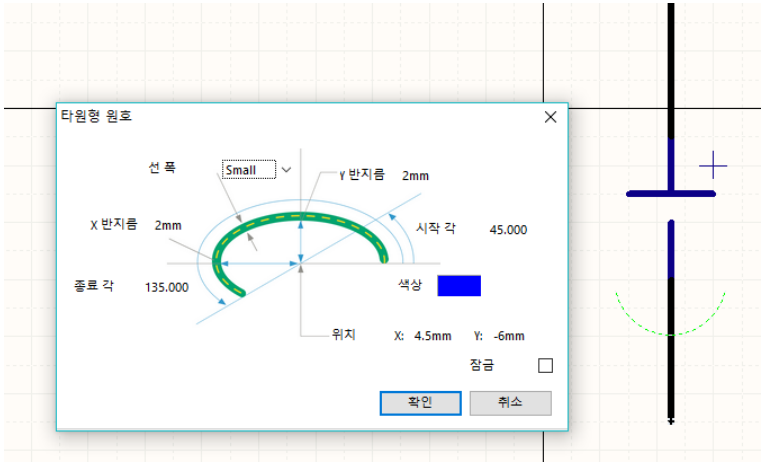


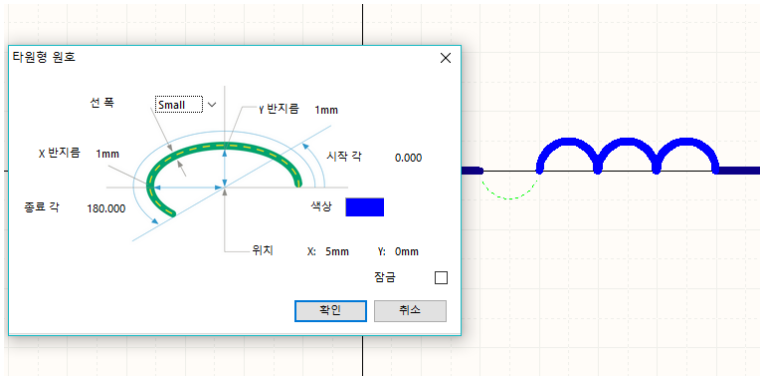




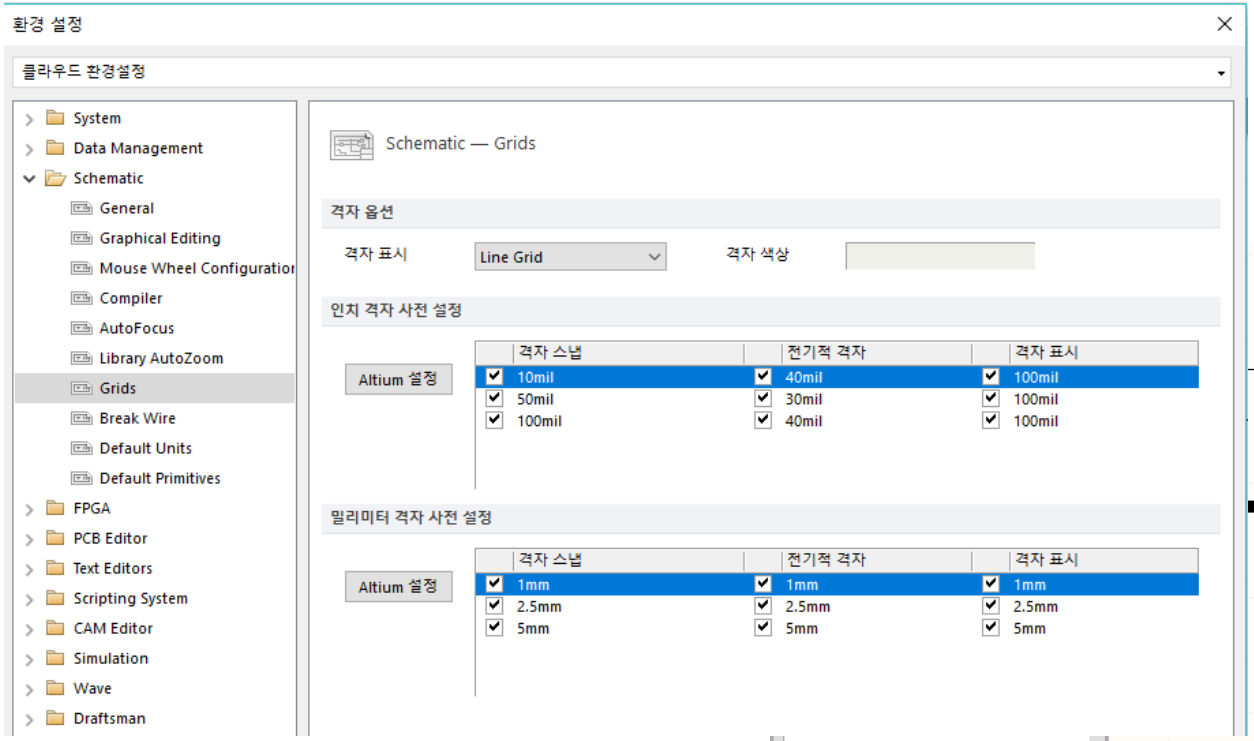


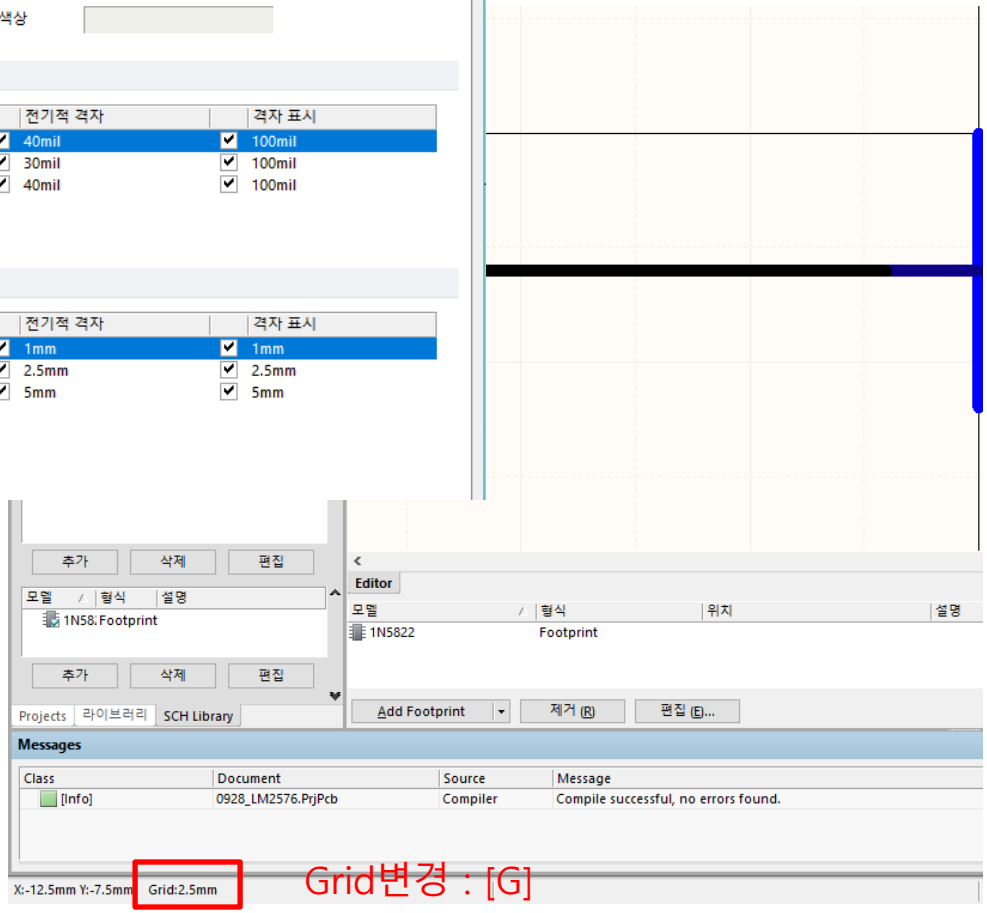
(*) Altium Design Procedure - Eclipse





(*) **Altium Design Procedure** – Change Grid



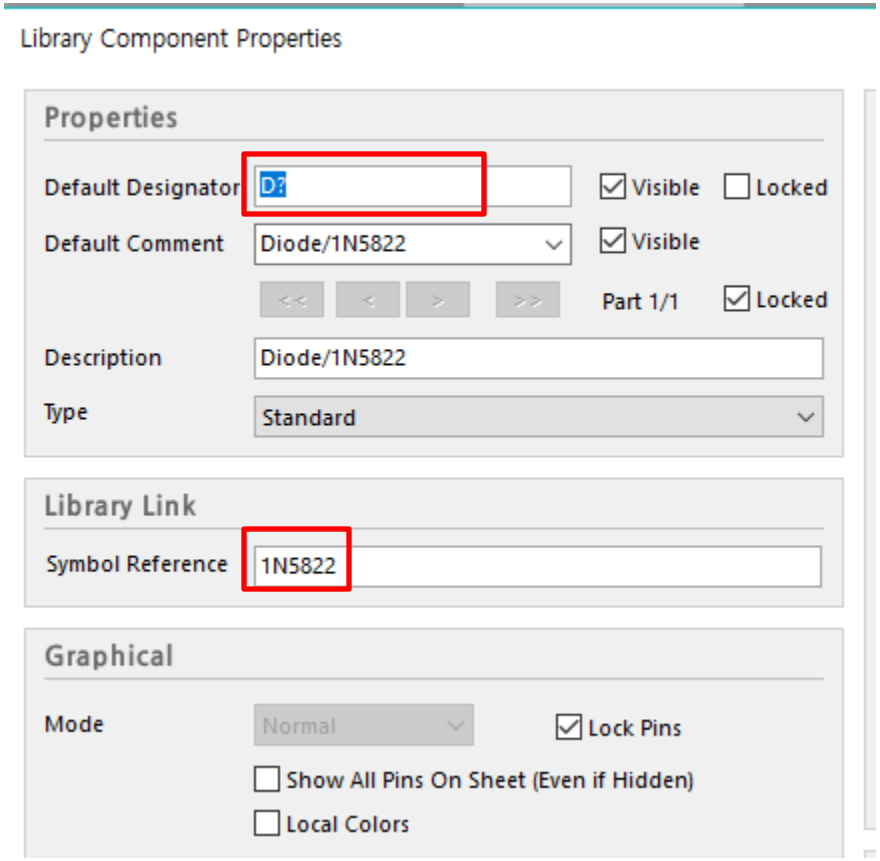


Altium Design Procedure

부품 설계 참조 번호
부품 기호 및 값

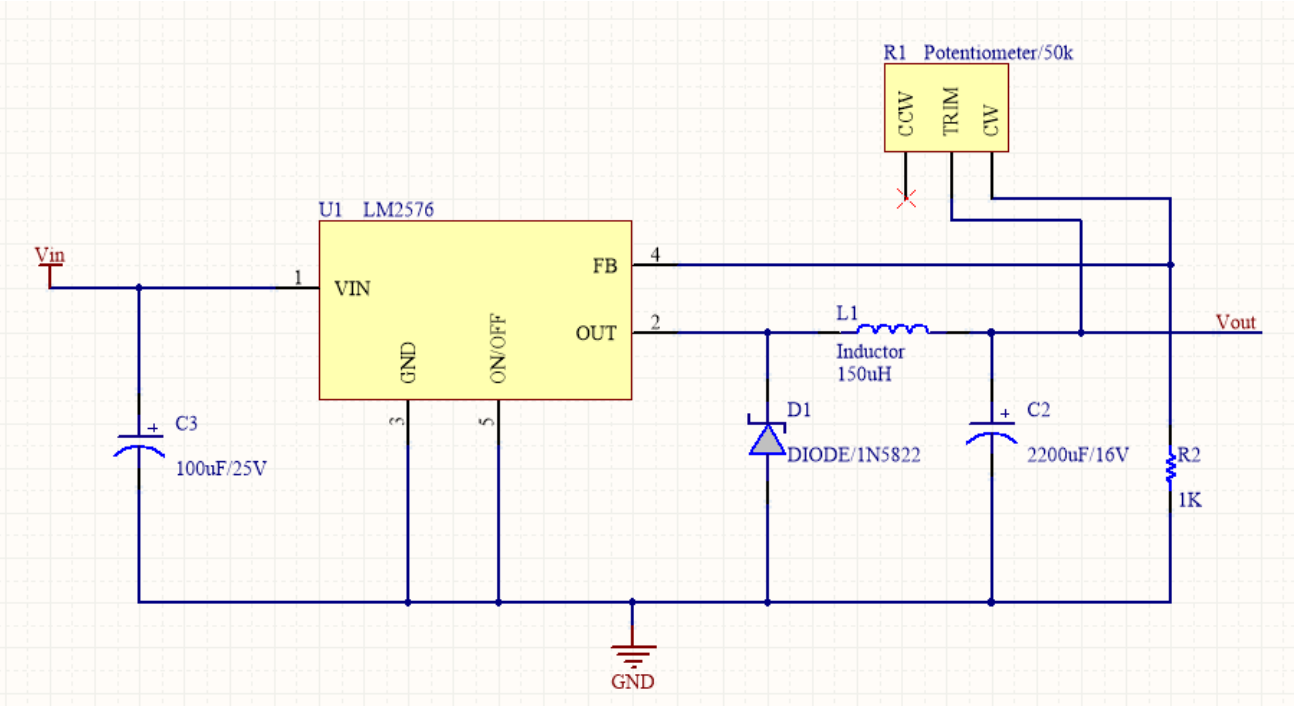
상세 설명

Symbol 이름



Altium Design Procedure - New PCB Project (Schdoc)

Schematic.doc → Compile, Message 확인

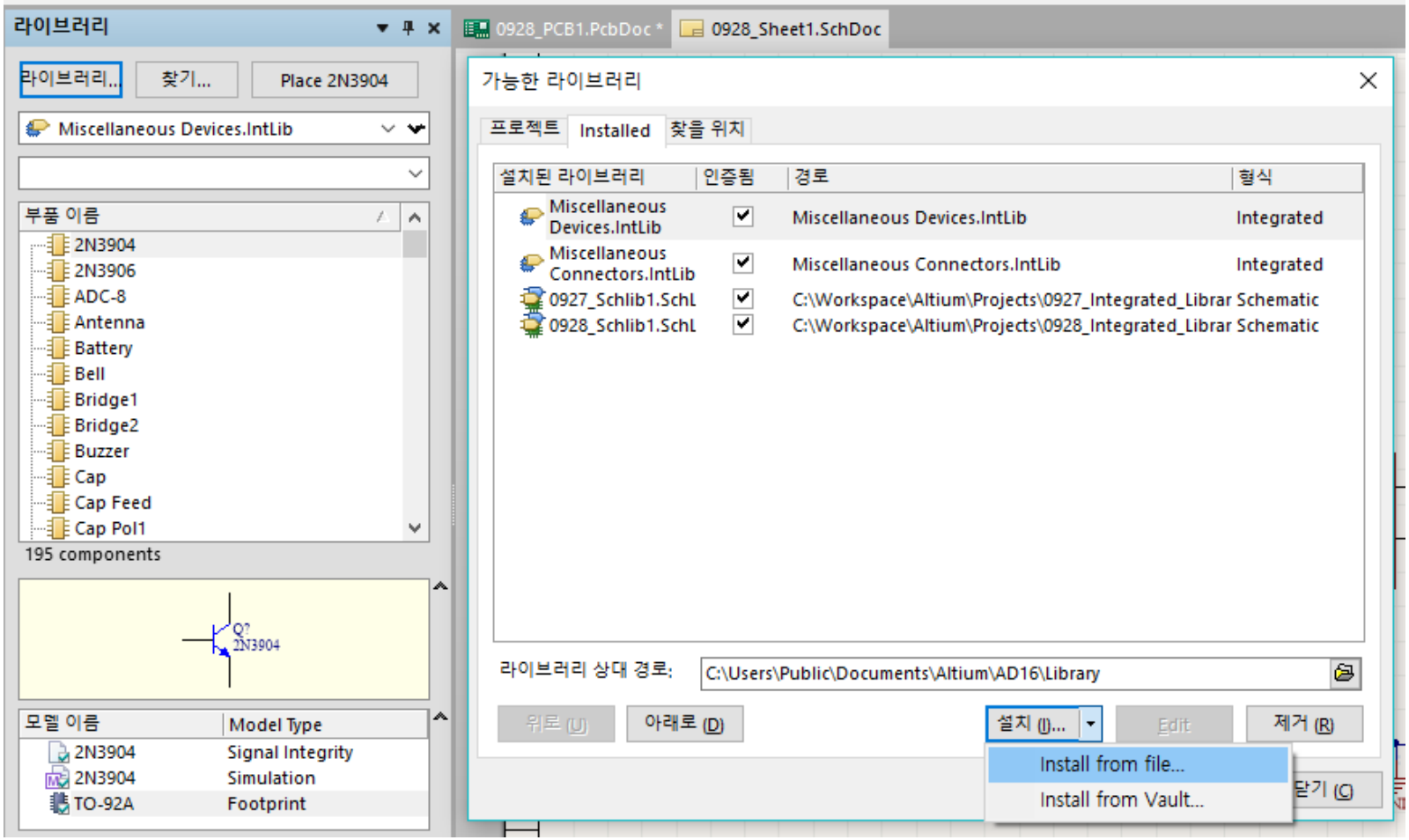


Messages

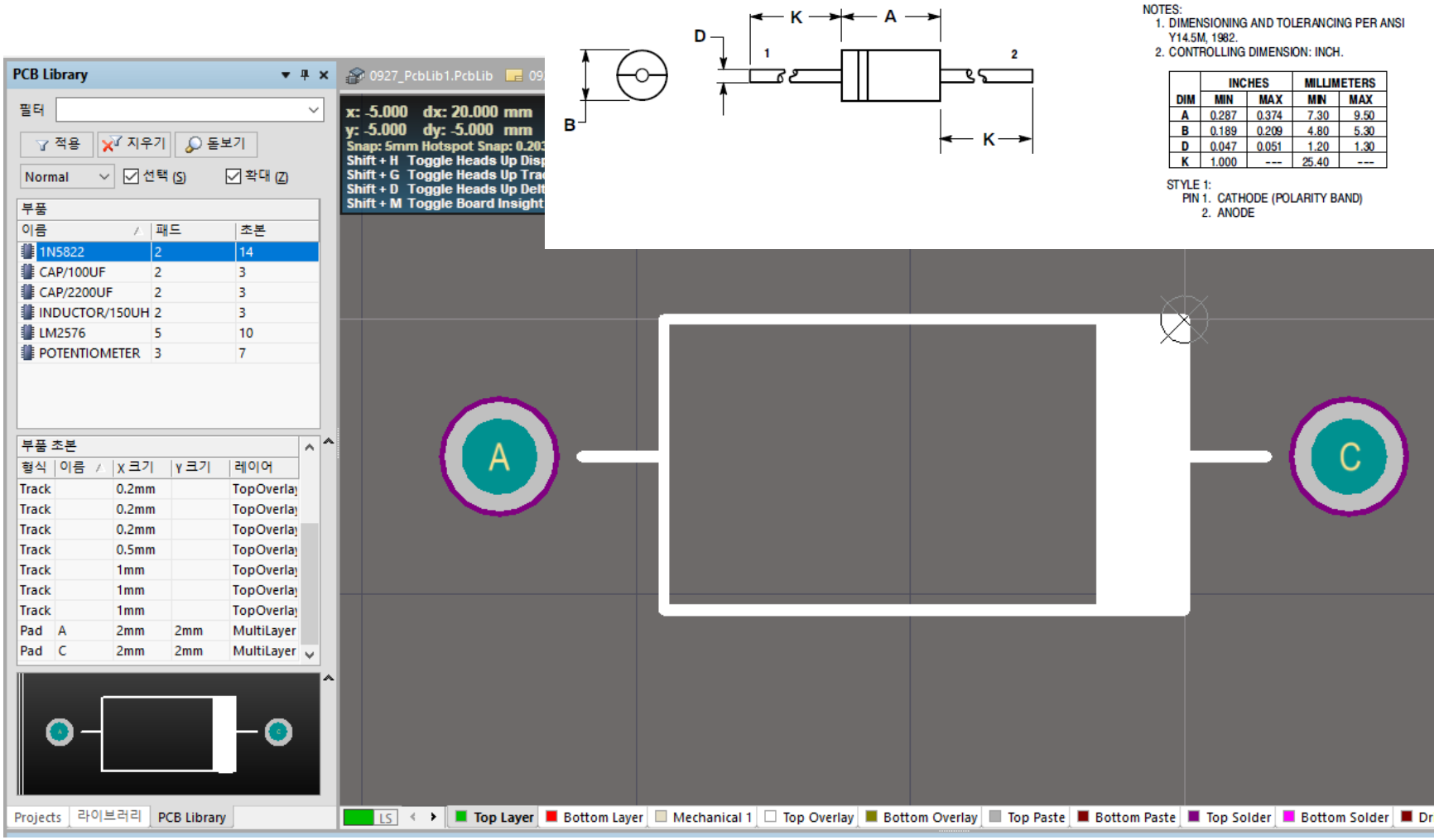
Class	Document	Source	Message
[Info]	0928_LM2576.PrjPcb	Compiler	Compile successful, no errors found.

Altium Design Procedure

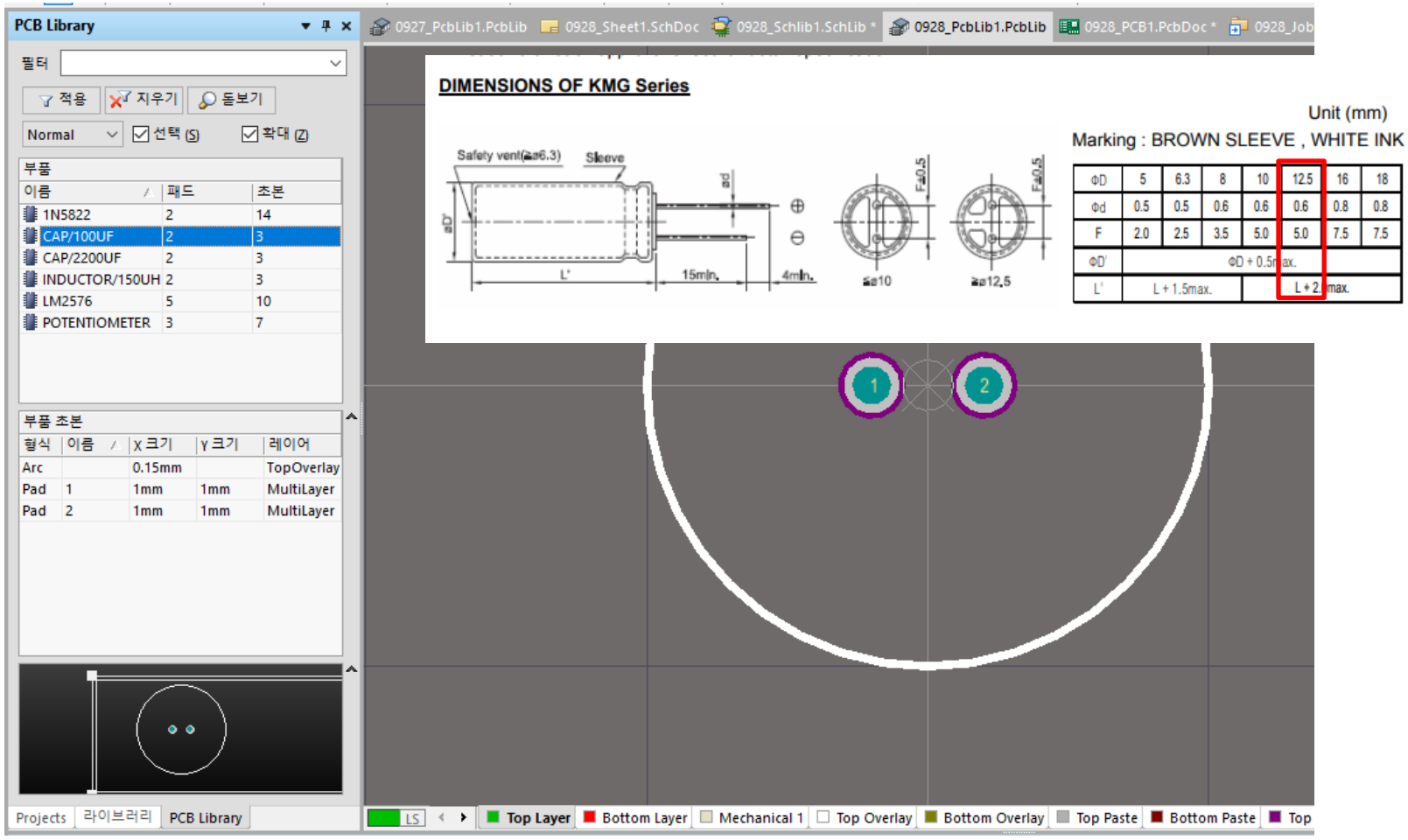
Integrated Library 추가



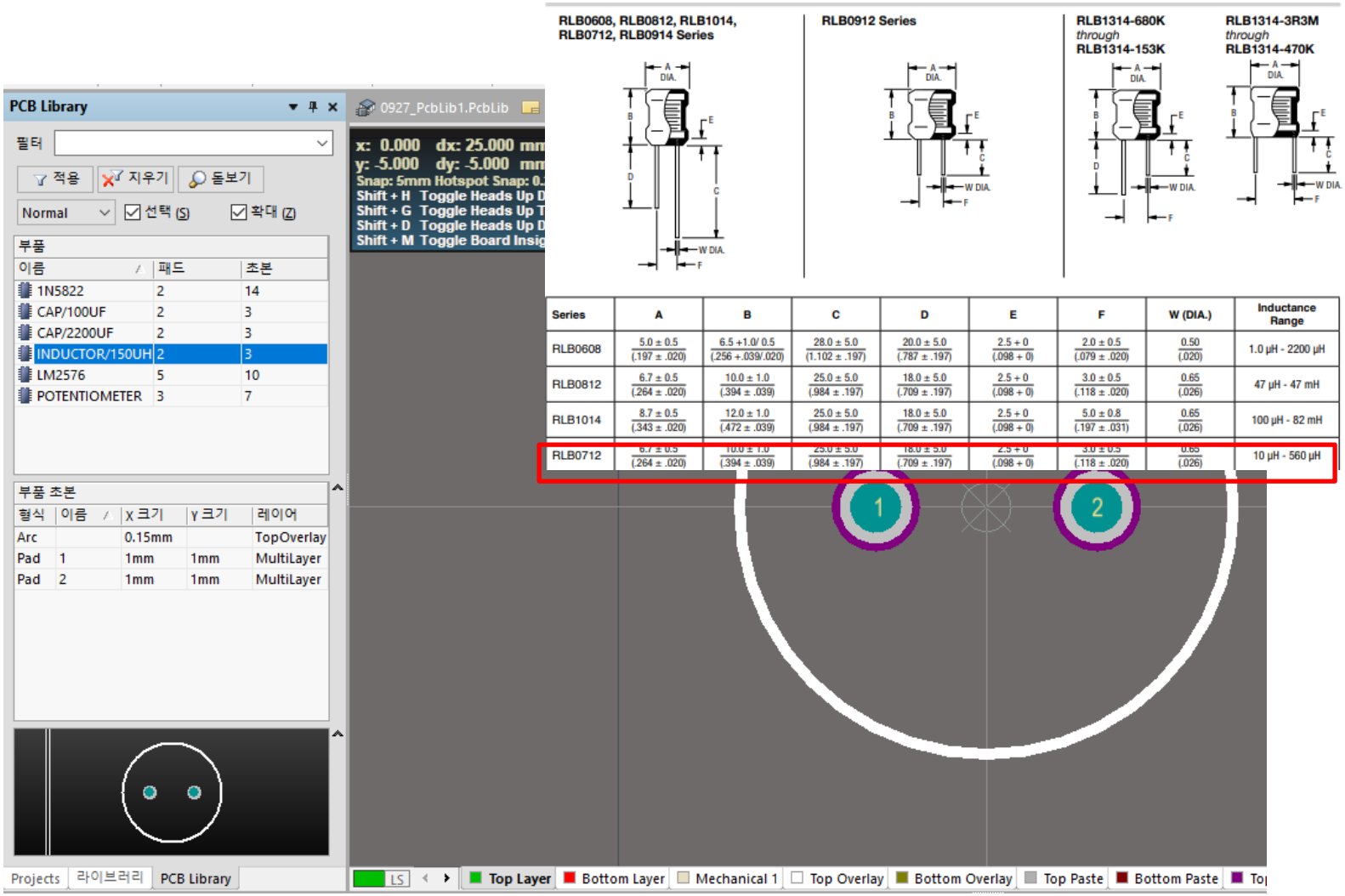
Altium Design Procedure – PCB Library



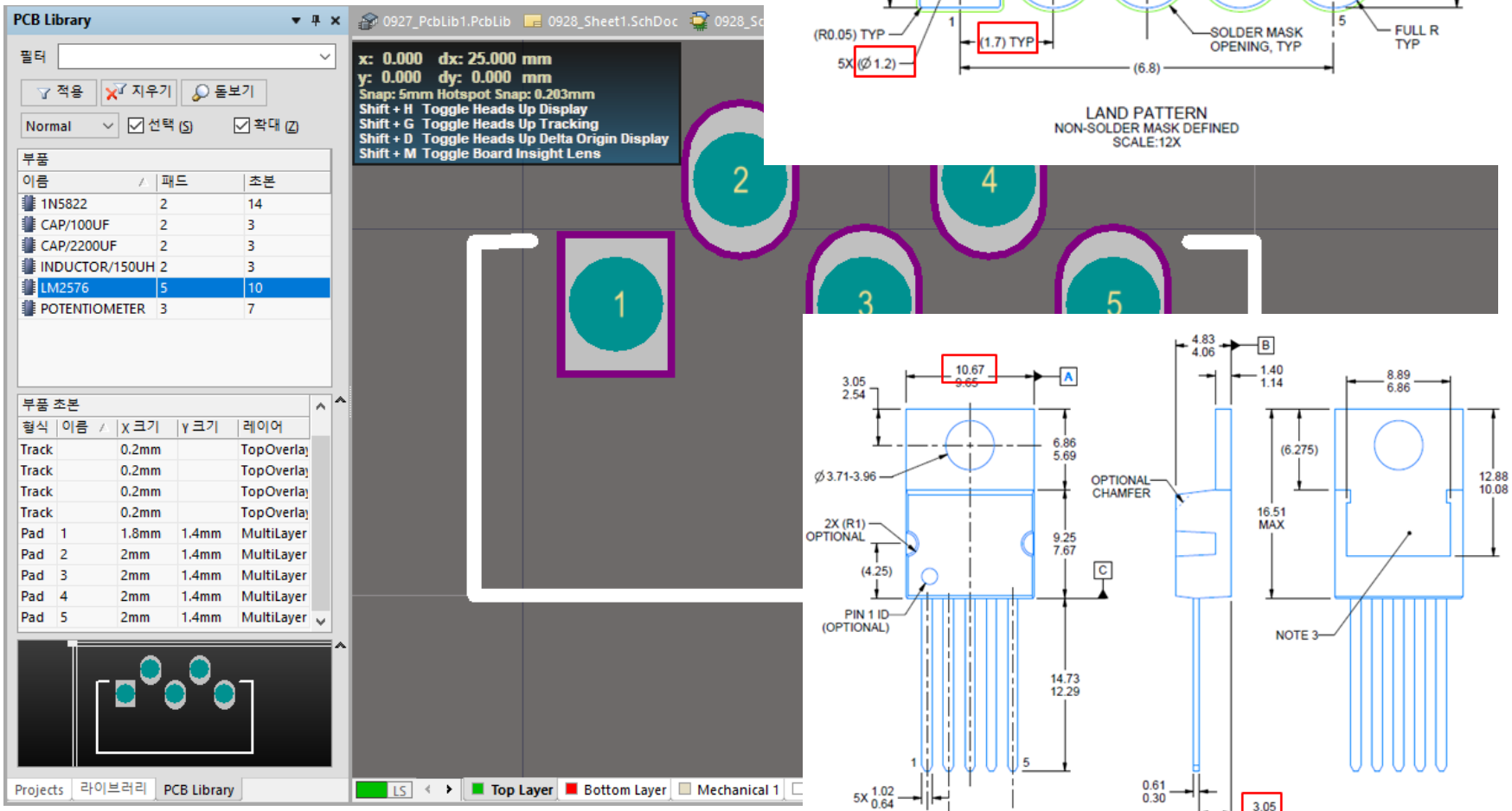
Altium Design Procedure



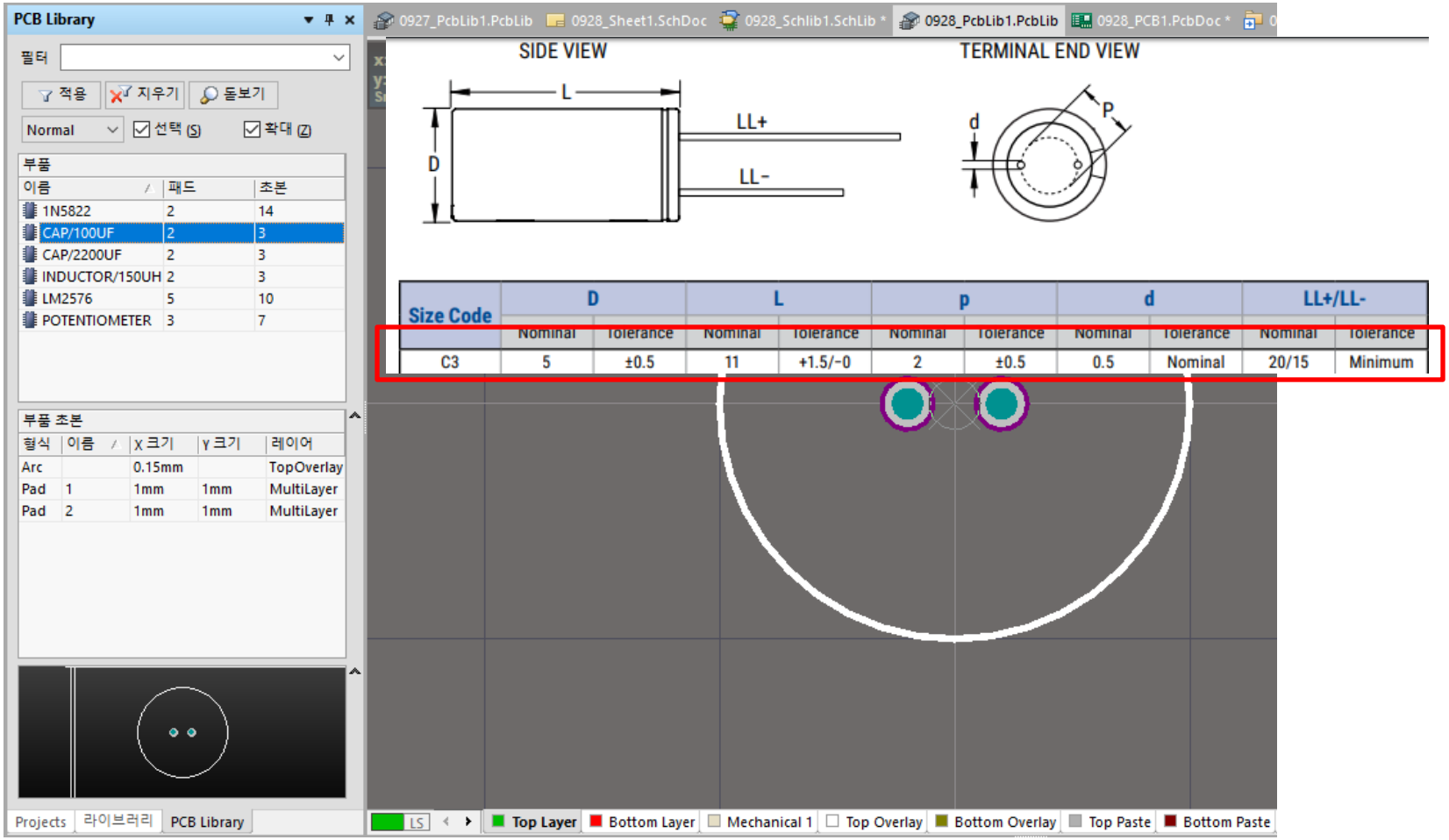
Altium Design Procedure



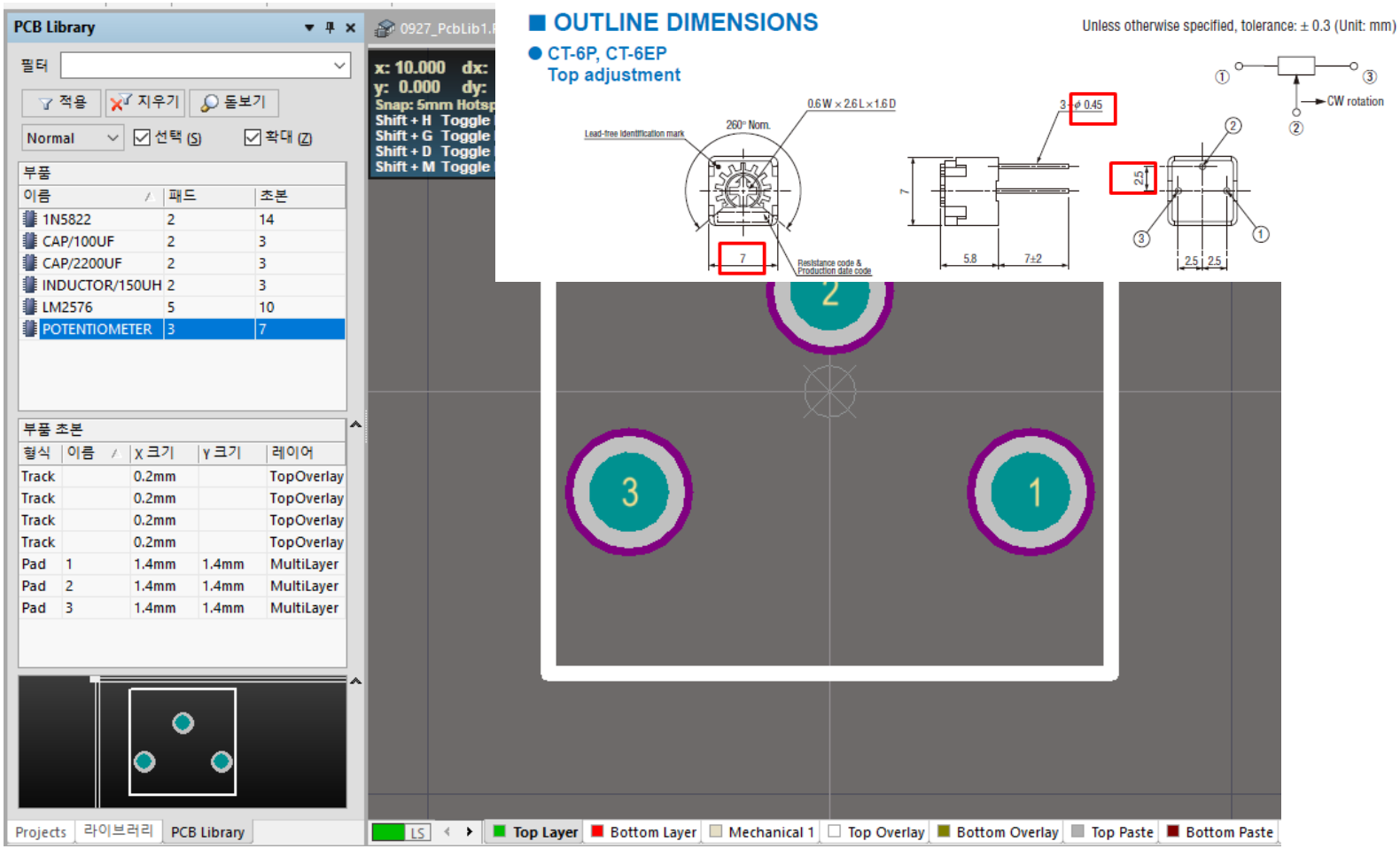
Altium Design Procedure



Altium Design Procedure

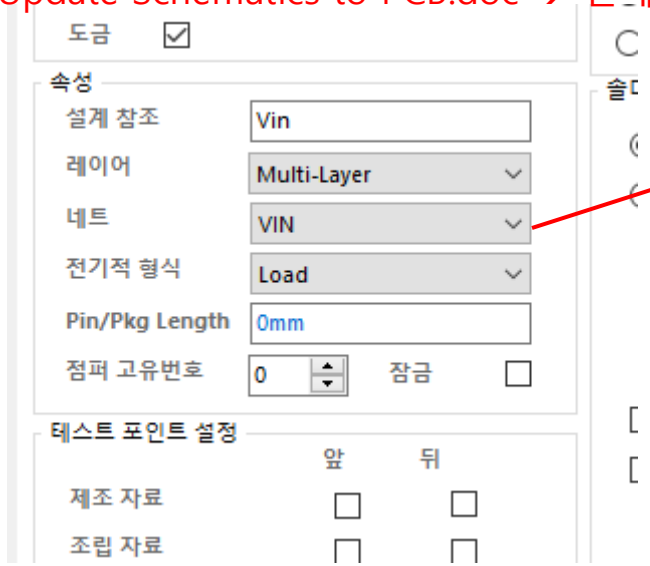


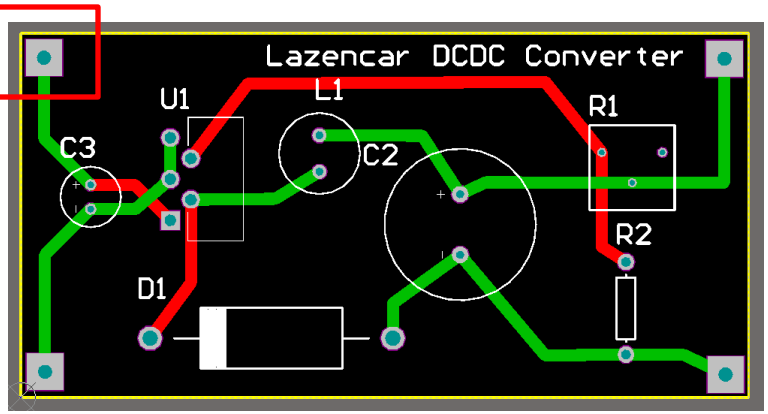
Altium Design Procedure

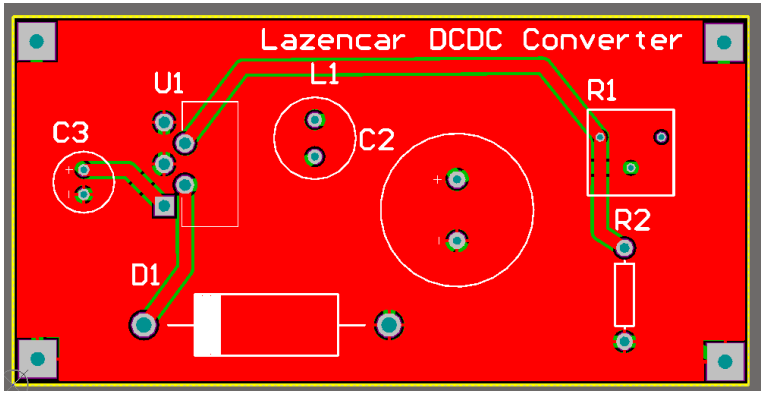


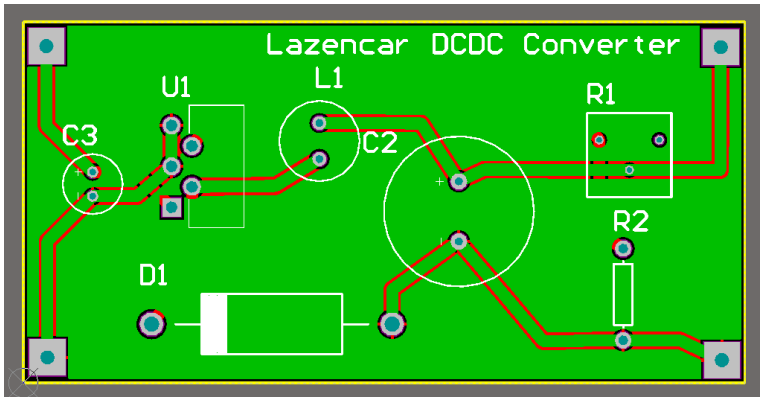
Altium Design Procedure - New PCB Project (PCBdoc)

Update Schematics to PCB.doc → 설계 규칙 검사

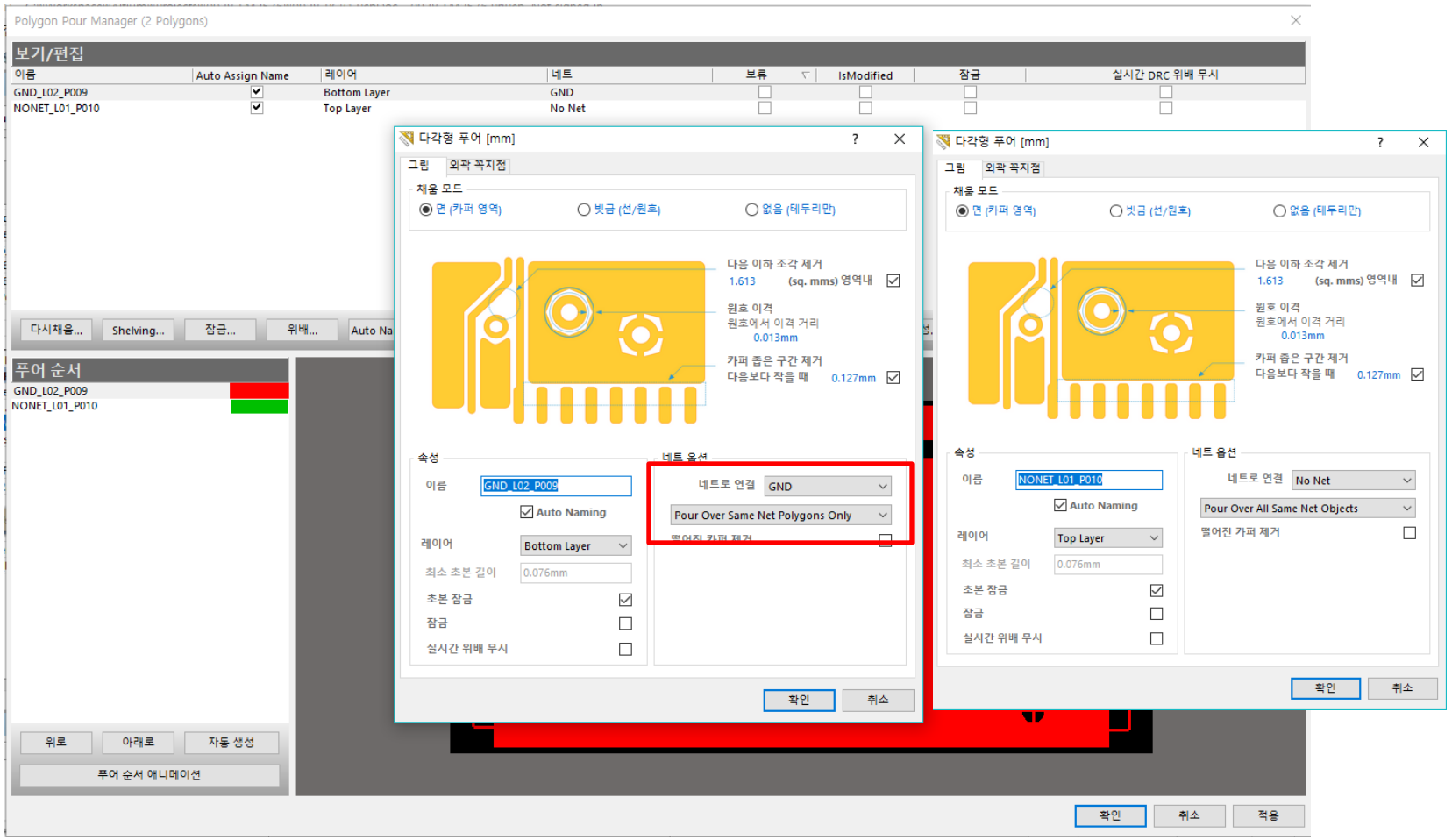




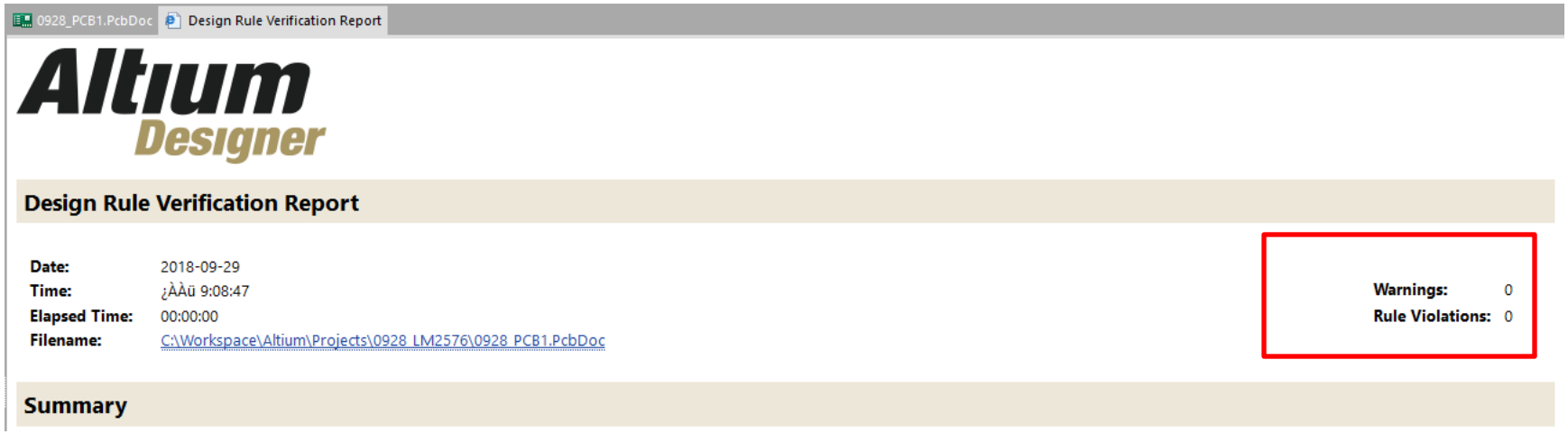




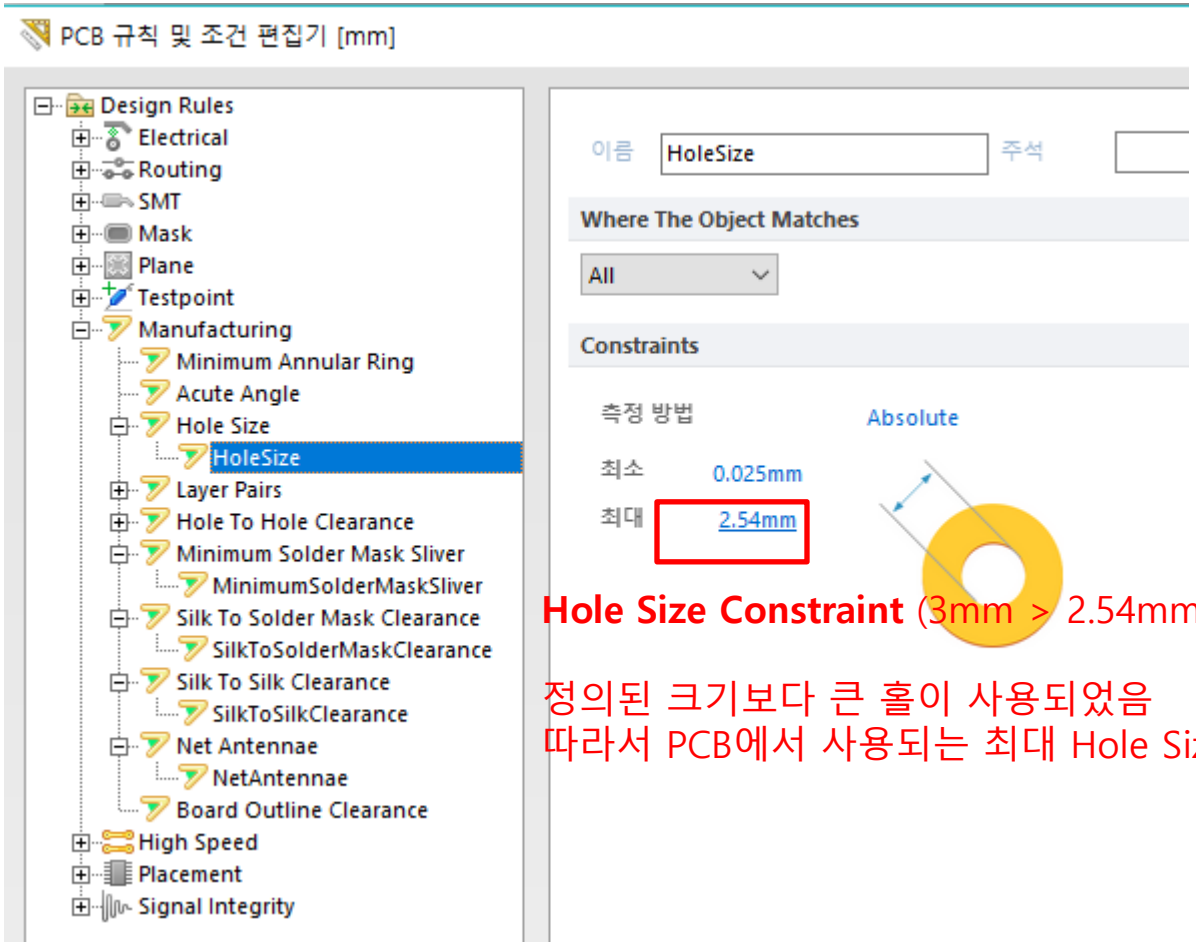
Altium Design Procedure



Altium Design Procedure – 설계 규칙 검사



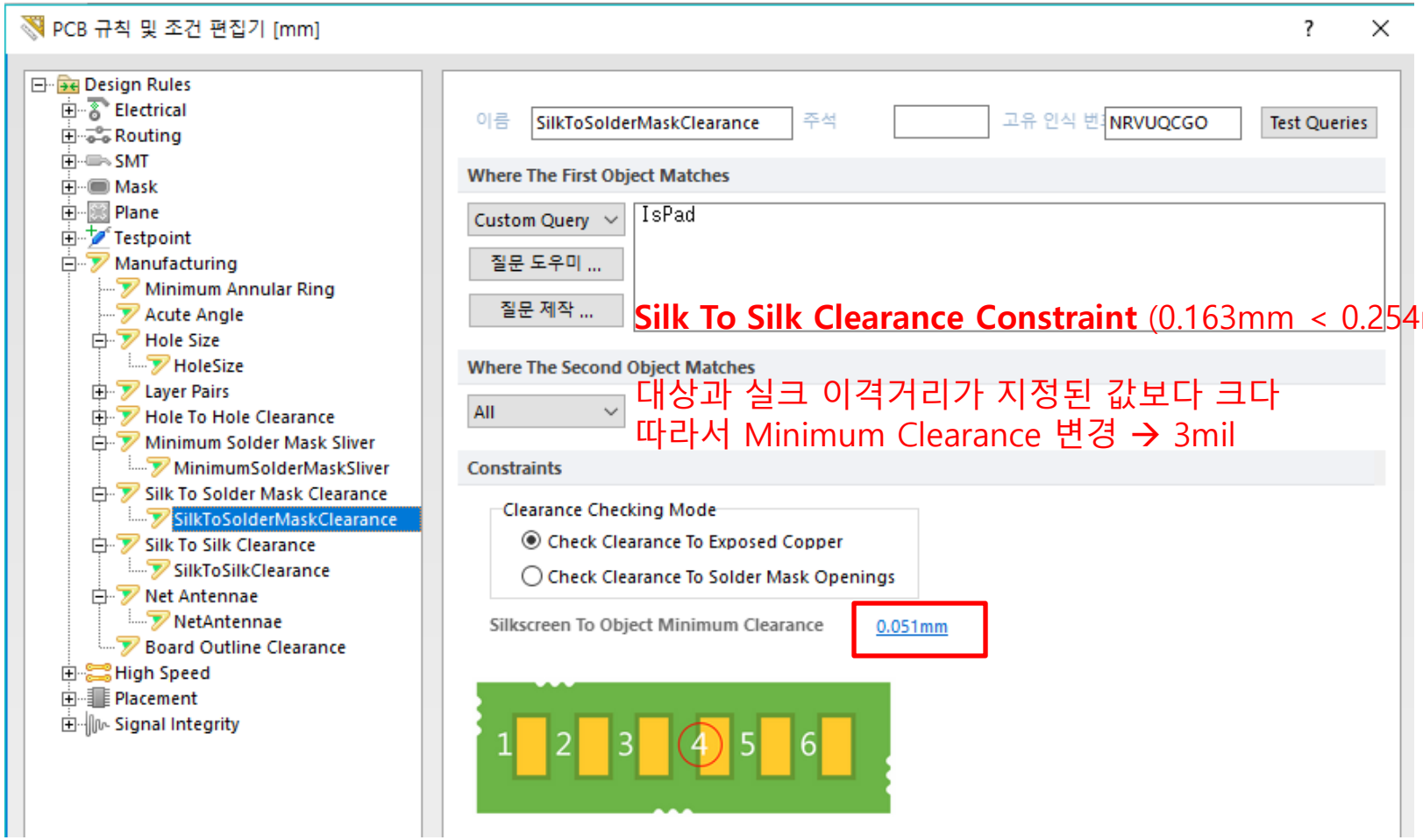
Altium Design Procedure – 설계 규칙 검사



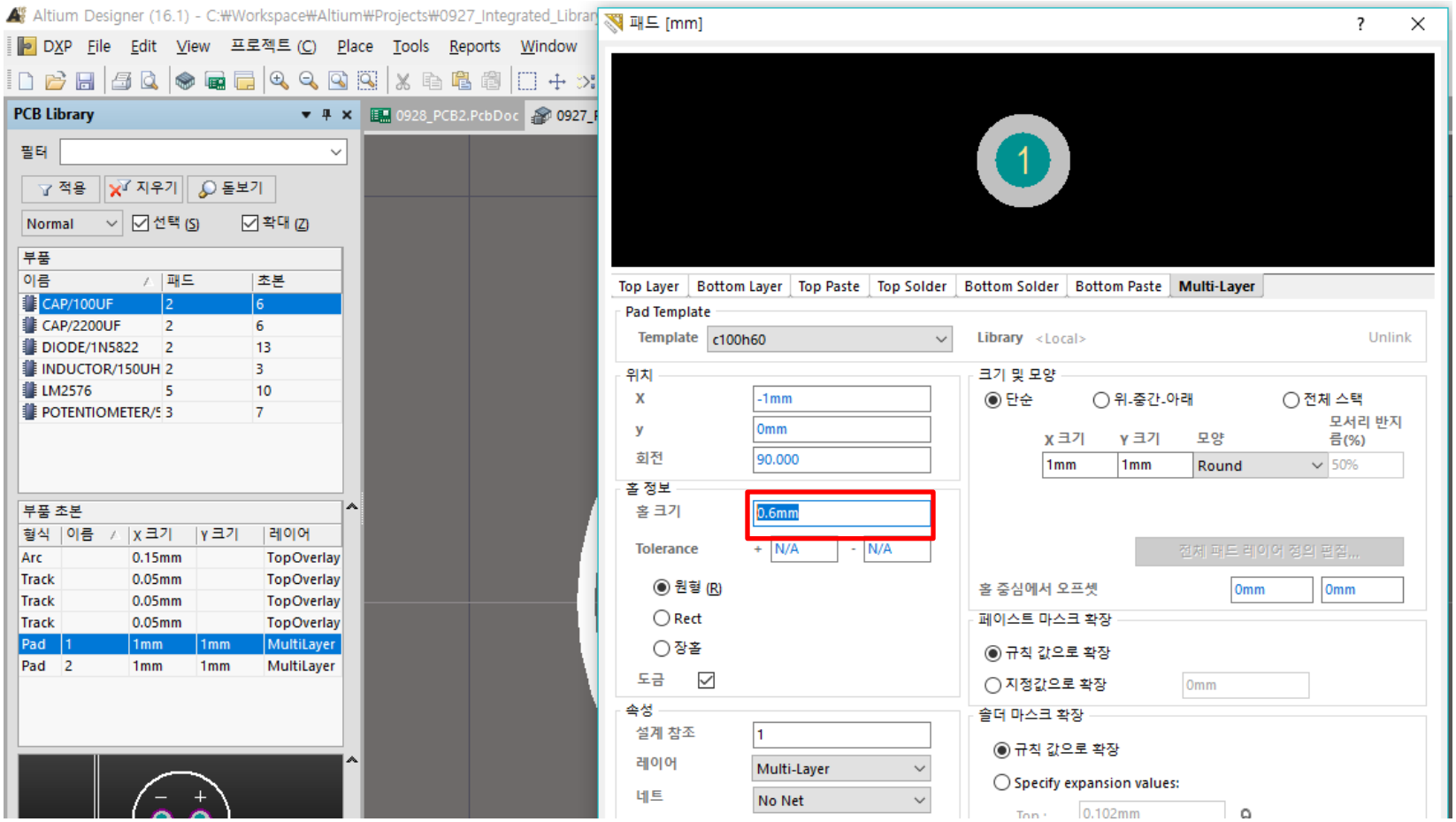
Hole Size Constraint (3mm > 2.54mm)

정의된 크기보다 큰 홀이 사용되었음
따라서 PCB에서 사용되는 최대 Hole Size 변경→ 10mm

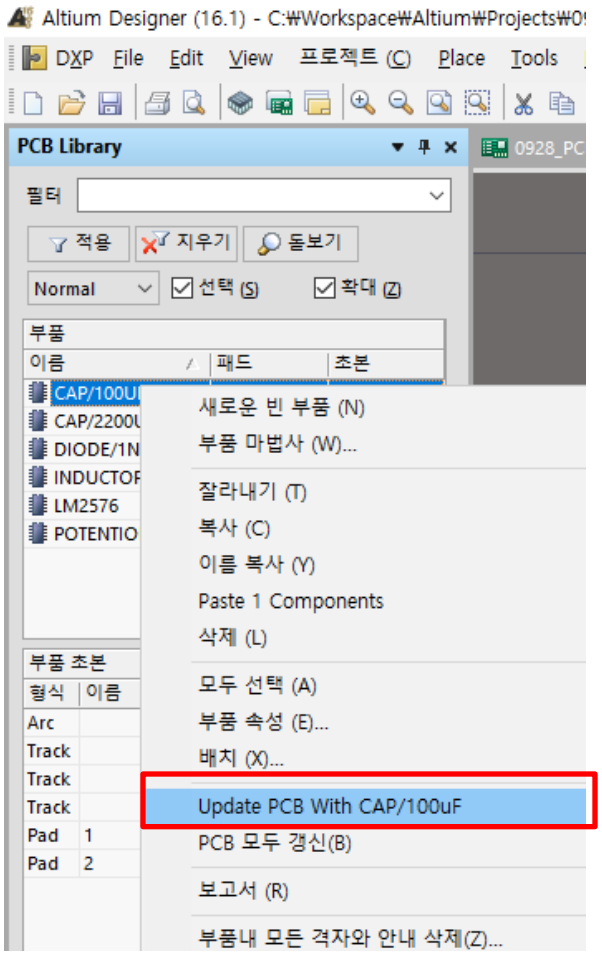
Altium Design Procedure – 설계 규칙 검사



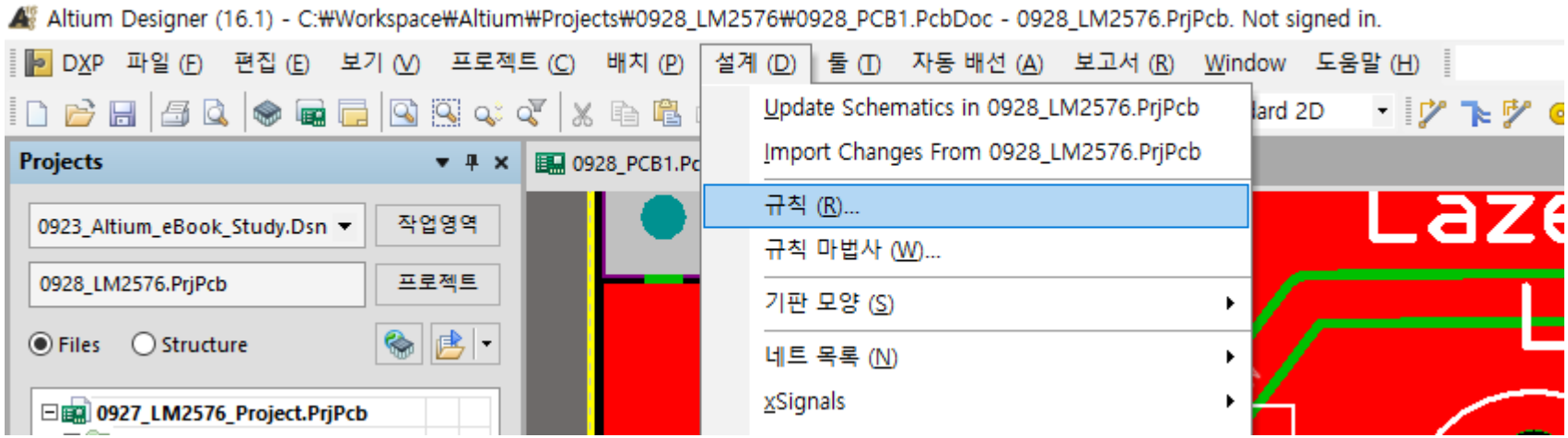
(*) Altium Design Procedure - PCB 라이브러리 갱신

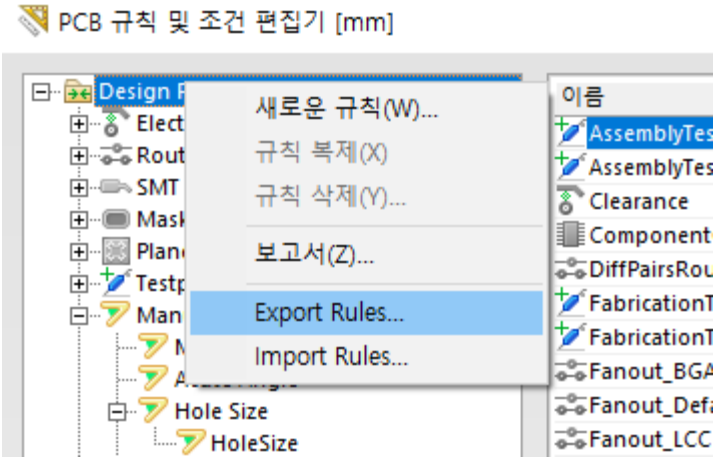


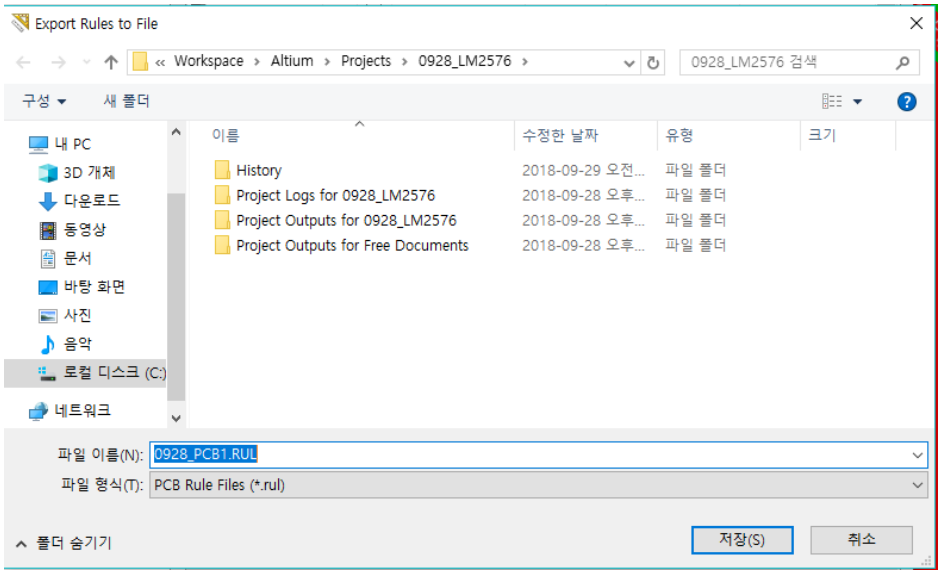
Altium Design Procedure



(*) Altium Design Procedure – 설계규칙 Export

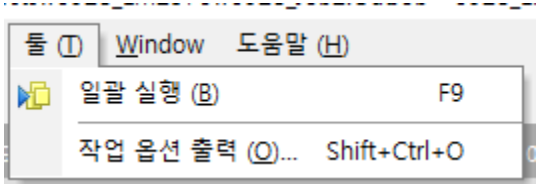


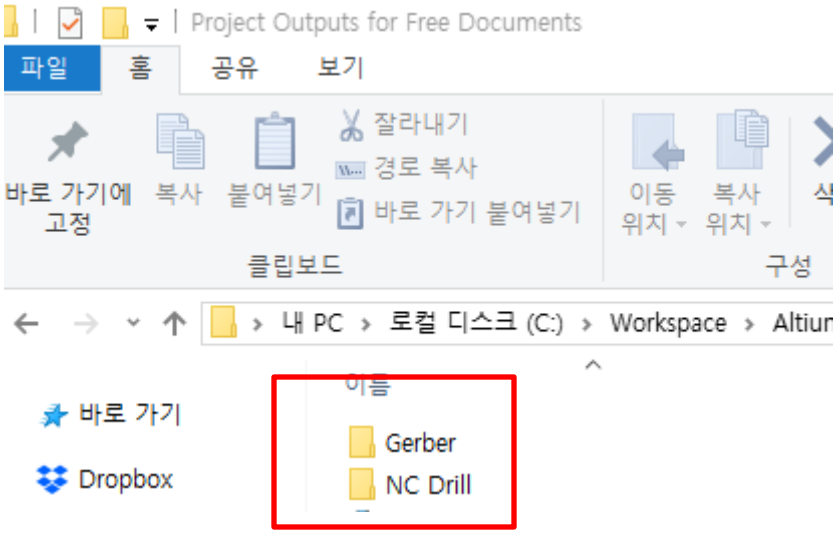




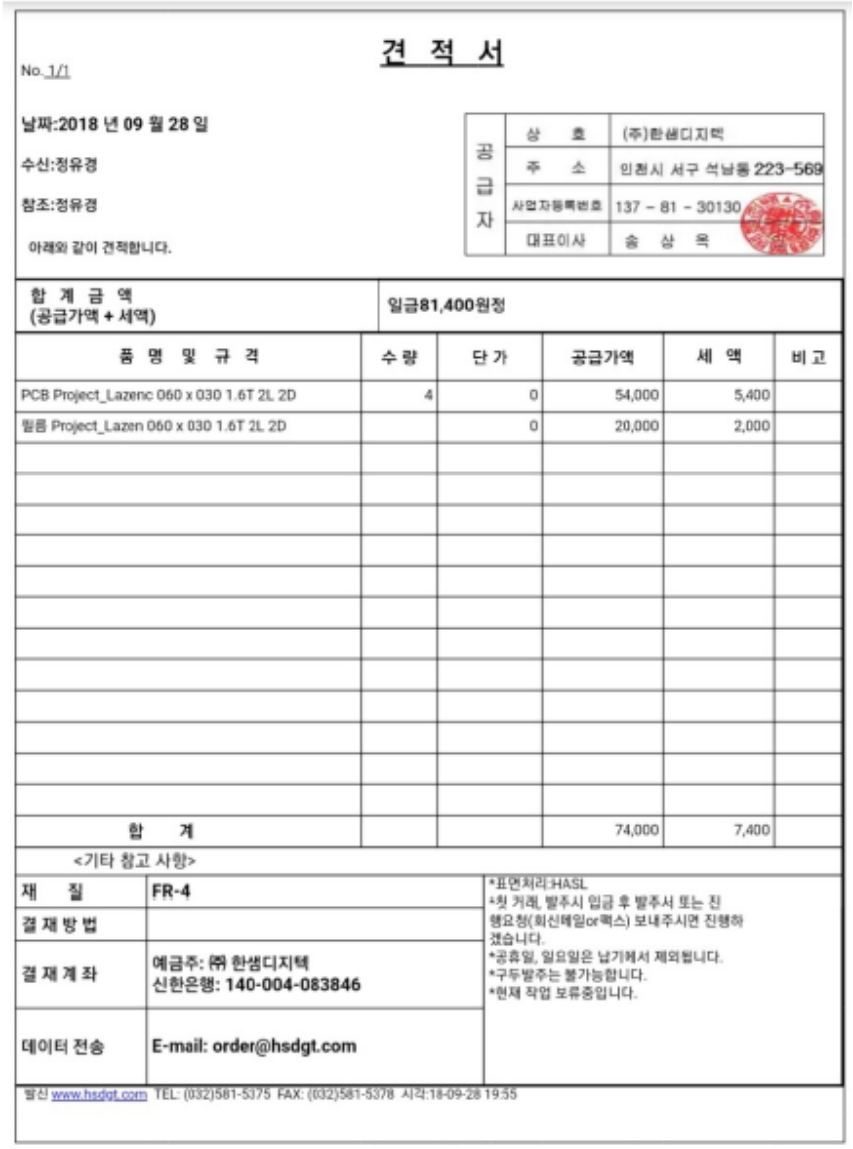
Altium Design Procedure - New PCB Project (Output Job)

Output Job File 생성 → 작업옵션 설정 → 일괄실행





PCB 발주



견 적 서

No. 1/1

날짜:2018 년 09 월 28 일

수신:정유경

참조:정유경

아래와 같이 견적합니다.

공급자		
	상 호	(주)한샘디지텍
	주 소	인천시 서구 석남동 223-569
	사업자등록번호	137 - 81 - 30130
	대표이사	송 상 옥

합 계 금 액 (공급가액 + 세액)	일금81,400원정

품 명 및 규 격	수 량	단 가	공급가액	세 액	비 고
PCB Project_Lazenc 060 x 030 1.6T 2L 2D	4	0	54,000	5,400	
밀름 Project_Lazen 060 x 030 1.6T 2L 2D		0	20,000	2,000	
합 계			74,000	7,400	

<기타 참고 사항>

재 질	FR-4	*표면처리:HASL *첫 거래, 발주시 입금 후 발주서 또는 진행요청(회신메일or팩스) 보내주시면 진행하겠습니다. *공휴일, 일요일은 납기에서 제외됩니다. *구두발주는 불가능합니다. *현재 작업 보류중입니다.
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