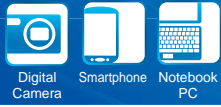


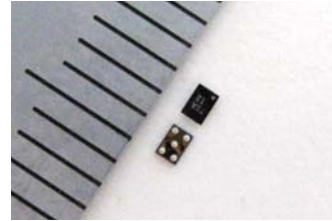
WLP(Wafer Level Package)

XC6602, XC9235/36/37 Series

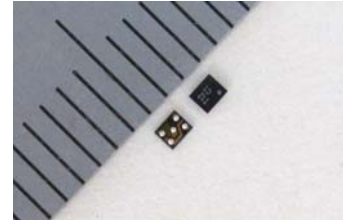


WLP stands for “Wafer Level Package”, and is a package for ultra-small chip sizes. The XC6602 series (LDO regulators) and the XC9235/XC9236/XC9237 series (step-down DC/DC converters) are available in a WLP package.

The XC6602 series are high-speed LDO regulators with an ultra-low ON resistance that can operate from an input voltage of 0.5V at a maximum output current of 1A maximum, and are ideal for applications that require efficient output of a large current at low voltages. The XC9235/XC9236/XC9237 series are synchronous step-down DC/DC converters with an internal 0.42 Ω Pch MOS driver Tr. and an internal 0.52 Ω Nch MOS switch Tr. These converters are able to provide a stable power supply with high efficiency at a maximum output of 600 mA.



WLP-5-02
(1.25x0.88x0.4mm)



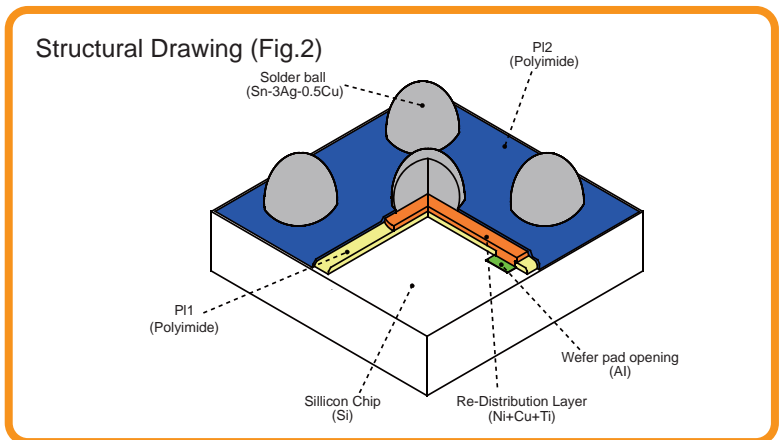
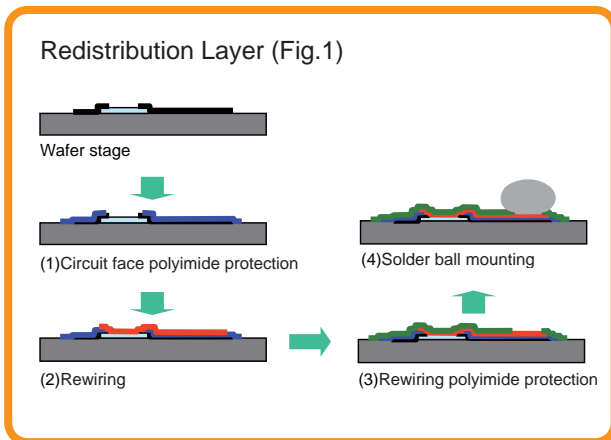
WLP-5-03
(1.26x1.06x0.4mm)



WLP(Wafer Level Package)

Torex’ s WLP (WL-CSP) is a Chip Scale Package. Using the WLP package, we are deploying a product line based on the concepts “ultra-small”, “ultra-thin”, and “conductivity”. The process consists of (1) circuit face polyimide protection, (2) rewiring, (3) rewiring polyimide protection, and (4) solder ball mounting (Fig. 1).

There is no protection on the silicon face and laser marking is performed directly, for a simple structure that enables the features “small”, “thin”, and “low cost”. The distance between the circuit face and parts that connect to the board (solder balls) is short, allowing higher heat dissipation and easier heat treatment design than other devices of similar size (refer to Fig. 2, Structural Drawing).



XC6602 Features			
Maximum Output Current	1A(1.3A Limit)	Ripple Rejection	60dB @ f=1kHz(V _{BIAS_PSR}) 75dB @ f=1kHz(V _{IN_PSR})
ON Resistance	0.15 Ω @ V _{BIAS} =3.6V, V _{OUT} =1.2V	Low Power Consumption	100 μA (V _{BIAS}), 6.5 μA (V _{IN}) @ V _{OUT} =1.2V
Bias Voltage Range	2.5V~6.0V	Stand-by Current	0.01 μA (V _{BIAS}), 0.01 μA (V _{IN})
Input Voltage Range	0.5V~3.0V	Function	Built-in Soft-start, CL Auto Discharge CE Pull-Down (Active High)
Output Voltage Range	0.5V~1.8V(0.1V increments)	Packages	USP-6C, SOT-26W, SOT-89-5, WLP-5-02
Output Voltage Accuracy	±0.015V @ V _{OUT} < 1.2V ±0.020V @ V _{OUT} ≥ 1.2V		

XC9235/XC9236/XC9237 Features			
Input Voltage Range	1.8V~6.0V	Maximum Duty Cycle	100%
Output Voltage Range	0.8V~6.0V	Function	Current Limiter Circuit Built-In(Constant Current & Latching) CL Discharge, High Speed Soft Start
Driver Transistor Built-In	0.42 Ω P-ch driver transistor 0.52 Ω N-ch switch transistor	Control Methods	PWM(XC9235) PWM/PFM Auto(XC9236) PWM/PFM Manual(XC9237)
High Efficiency	92%(TYP.)	Packages	SOT-25, USP-6C, USP-6EL, WLP-5-03
Output Current	600mA		
Oscillation Frequency	1.2MHz, 3.0MHz (±15%)		



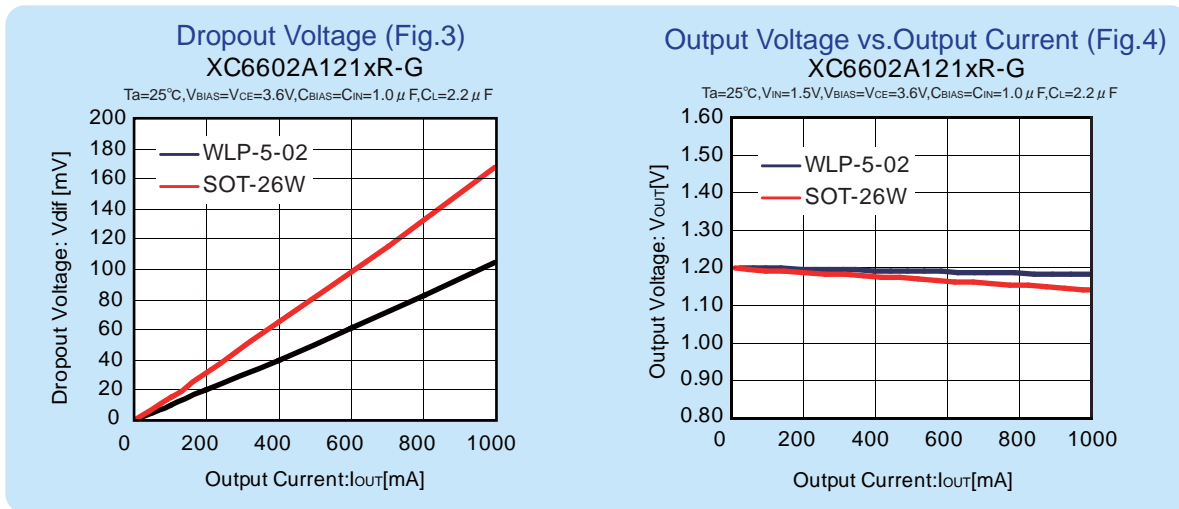
WLP(Wafer Level Package) **XC6602, XC9235/36/37 Series**



XC6602 Series

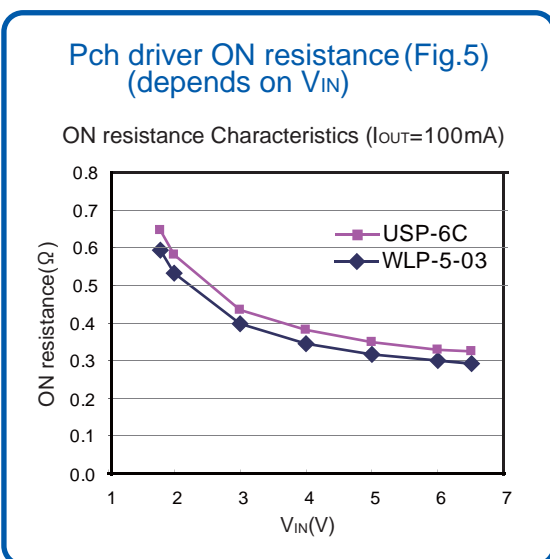
The XC6602 series are 1A high-speed LDO regulators that support a low input voltage (from 0.5V). Bias voltage drive is used to enable operation at a low ON resistance even when the output voltage is low. In addition, voltage drops on the input-output line due to load fluctuations are reduced, and operation at a lower dropout voltage than previous products is possible. A stable output voltage can be supplied even when a large current is required.

Since WLP-5-02 uses metal wiring instead of wire bonding, it can achieve a lower On resistance. As a result, the characteristic of dropout voltage and V_{out} - I_{out} are improve compared with the usual packages. (Fig. 3,4)



XC9235/XC9236/XC9237 Series

Since WLP-5-03 package use metal wiring instead of wire bonding, the WLP-5-03 package enables to achieve 0.03Ω to 0.05Ω lower On resistance than other packages, which results in increasing the efficiency by 2 to 3% during heavy loads. (Fig. 5)



Miniaturization is achieved

Using a WLP package can be a space saving.

