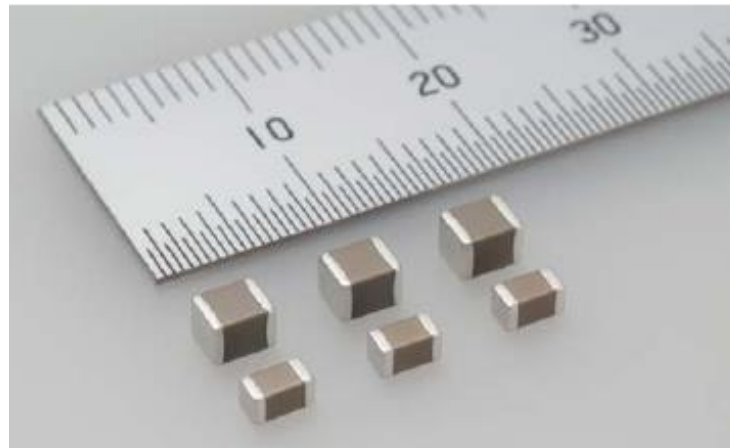


Multilayer Ceramic Capacitors

*Super Hi-Value MLCC
over 100uF Line Up
for Polymer Cap. Replacement*



X5R

Case Size	WV	Capcitanace / uF						
		107	157	227	337	477	687	108
2012 (0805)	4	①		2015				
	6.3	14/2H						
	10							
3216 (1206)	4	②	⑧	⑨				
	6.3	③		2015				
	10	14/1H						
3225 (1210)	4	④	⑬13/Q4	⑩	⑫	2015		
	6.3	⑤	⑬13/Q4	⑪	14/1H			
	10	⑥	14/1H					
	16	⑦						
4532 (1812)	4				14/1H	14/2H	2015	2016
	6.3				14/1H			
	10				14/1H			

- ① AMK212BBJ107MG
- ② AMK316ABJ107ML
- ③ JMK316ABJ107ML
- ④ AMK325ABJ107MM
- ⑤ JMK325ABJ107MM
- ⑥ LMK325ABJ107MM
- ⑦ EMK325ABJ107MM
- ⑧ AMK316BBJ157ML
- ⑨ AMK316BBJ227ML
- ⑩ AMK325ABJ227MM
- ⑪ JMK325ABJ227MM
- ⑫ AMK325ABJ337MM
- ⑬ AMK325ABJ157MM
- ⑭ JMK325ABJ157MM

Sample Available
Sample Available

MP予定: 13/10
MP予定: 13/10

X6S

Case Size	WV	Capcitanace / uF				
		107	157	227	337	477
2012 (0805)	2.5	①				
	4	14/2H				
	6.3					
	10					
3216 (1206)	4	②		2015		
	6.3	14/1H				
	10	14/2H				
	16					
3225 (1210)	2.5				⑦	
	4	③	⑬13/Q4	⑥		
	6.3	④	14/1H			
	10	⑤				
	16	14/1H				
4532 (1812)	2.5				14/1H	14/2H
	4				14/1H	

- ① PMK212BC6107MG
- ② AMK316AC6107ML
- ③ AMK325AC6107MM
- ④ JMK325AC6107MM
- ⑤ LMK325AC6107MM
- ⑥ AMK325AC6227MM
- ⑦ PMK325AC6337MM

⑧ AMK325AC6157MM

Sample Available

MP予定: 13/10

Blue: MP
Yellow: Under Development
Gray: Development Plan

100uF \leq Line Up (for Automotive Infotainment or Non-critical Application)

X5R

Case Size	WV	Capcitanse / uF						
		107	157	227	337	477	687	108
2012 (0805)	4	2015						
	6.3							
	10							
3216 (1206)	4	①		14Q2				
	6.3	②						
	10	14/2H						
	16							
3225 (1210)	4	③	14/1H	⑥	14/1H			
	6.3	④	14/2H	2015				
	10	⑤	14/2H					
	16	14/1H						
	25							
4532 (1812)	4				14/2H	2015		
	6.3				2015			
	10				2015			

MP	①	AMK316ABJ107MLH
	②	JMK316BBJ107MLH
	③	AMK325ABJ107MMH
	④	JMK325ABJ107MMH
	⑤	LMK325ABJ107MMH
	⑥	AMK325ABJ227MMH

X6S

Case Size	WV	Capcitanse / uF		
		107	157	227
3216 (1206)	4	①		
	6.3	14/2H		
	10			
	16			
3225 (1210)	2.5			④
	4	②	14/2H	2015
	6.3	③		
	10	14/1H		
	16			
4532 (1812)	4			
	6.3			
	10			

MP	①	AMK316BC6107MLH
	②	AMK325AC6107MMH
	③	JMK325AC6107MMH
	④	PMK325AC6227MMH

Blue: MP
Yellow: Under Development
Gray: Development Plan

MLCC 100uF over Line up vs Polymer

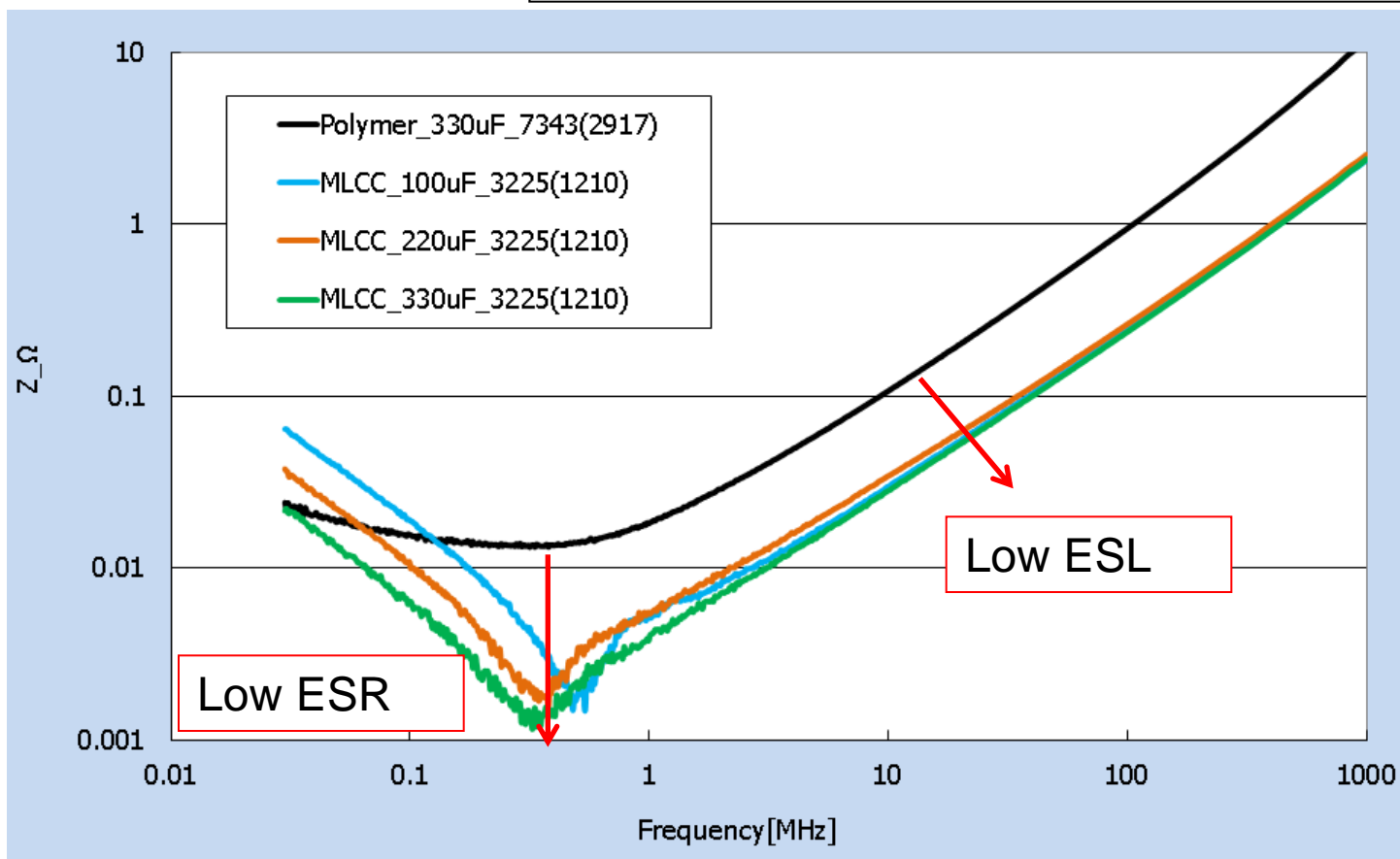
High Performance (Low ESR·Low ESL)

High reliability & Down Size

Area Size

Polymer Case size $7.3 \times 4.3\text{mm} = 31.39\text{mm}^2$

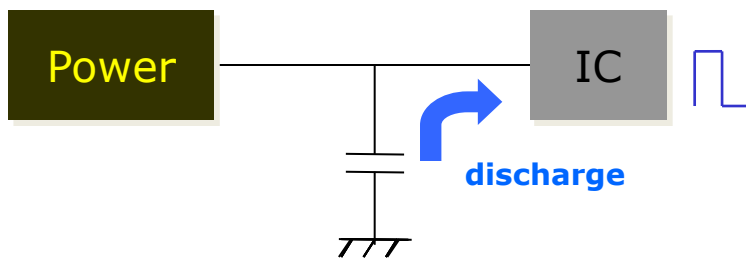
MLCC Case size $3.2 \times 2.5\text{mm} = 8\text{mm}^2$



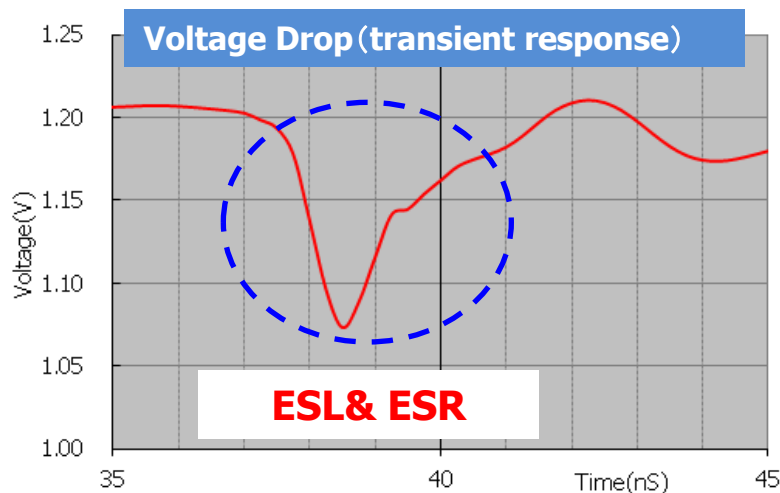
Application examples

transient response

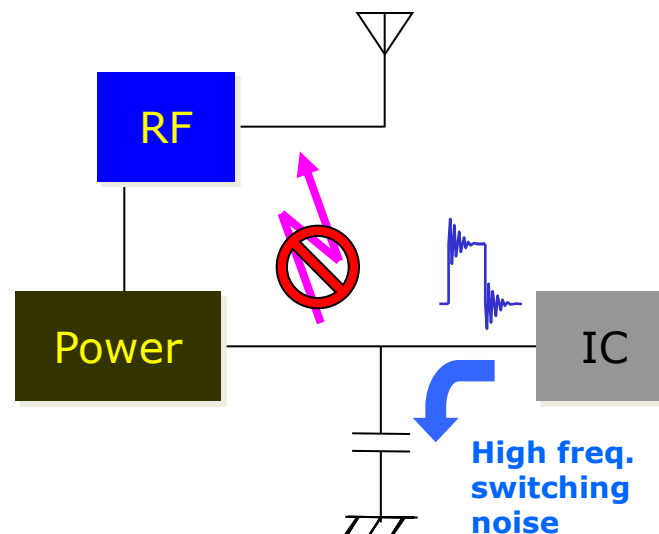
* Backup capacitor for voltage drop



Low ESL·ESR : Good transient response



* RF noise decoupling

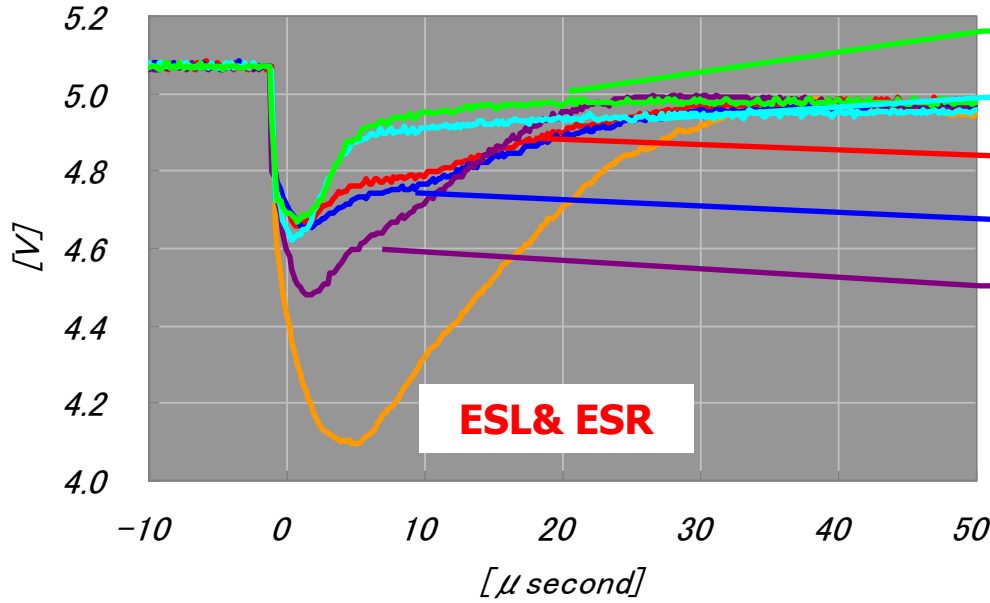


Low ESL·ESR

- Low impedance at high frequency
- good noise decoupling performance

MLCC 100uF vs Polymer

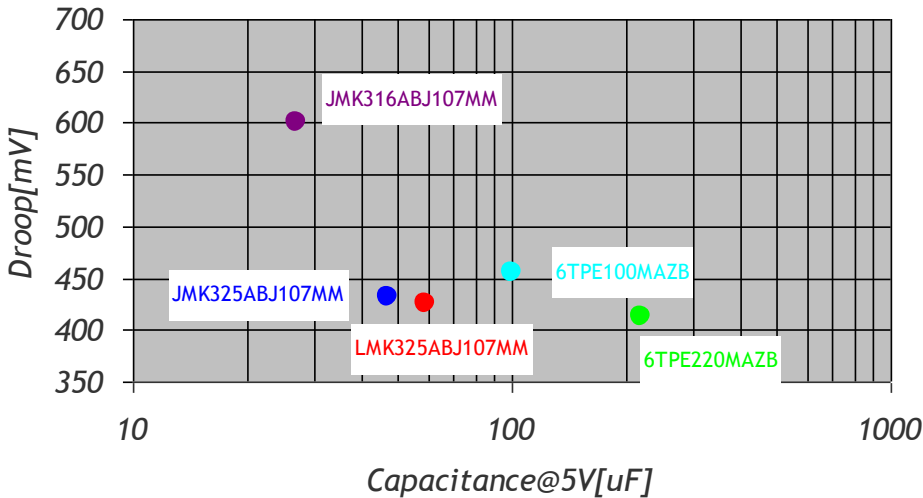
1port USB2.0 Droop Test Result



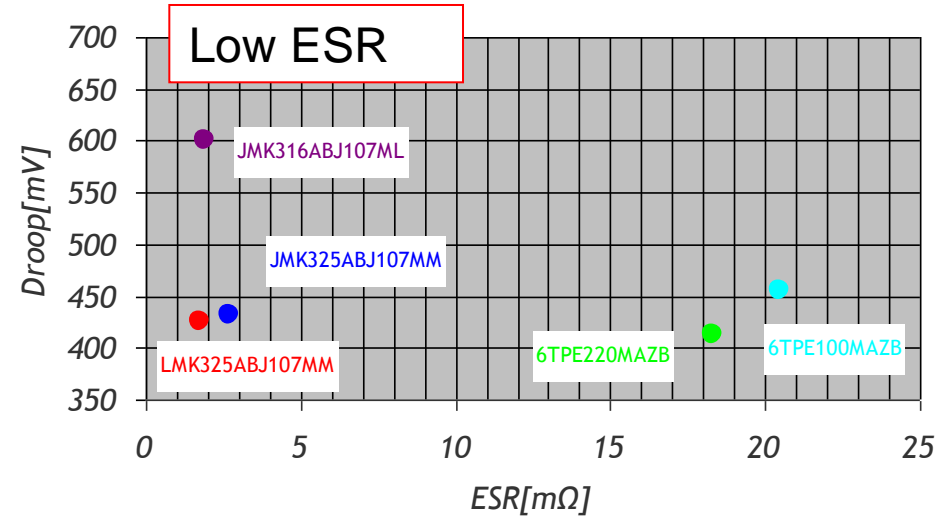
		Droop[mV]
POSCAP	6TPE220MAZB	413
	6TPE100MAZB	456
MLCC	LMK325ABJ107MM	425
	JMK325ABJ107MM	431
	JMK316ABJ107ML	600
W/O		982

	L	W	area	rate
POS	7.3	4.3	31.39	1
3225	3.2	2.5	8	1 / 4
3216	3.2	1.6	5.12	1 / 6

Capacitance @5V/Droop[mV]

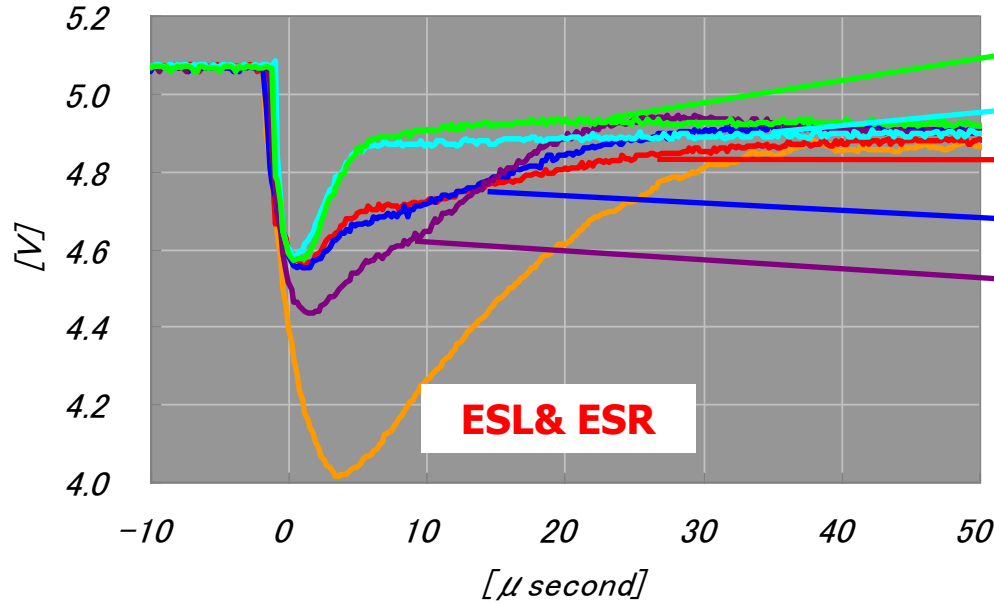


ESR[mΩ]/Droop[mV]



MLCC 100uF vs Polymer

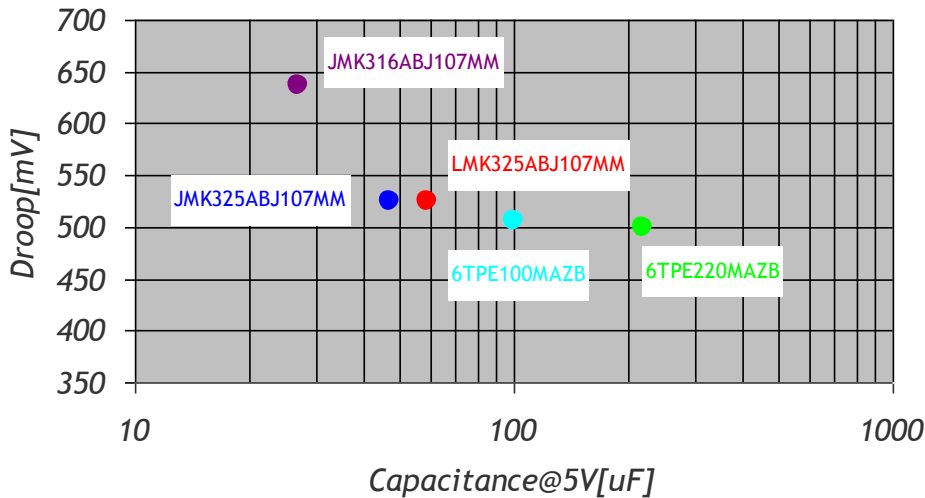
1port USB3.0 Droop Test Result



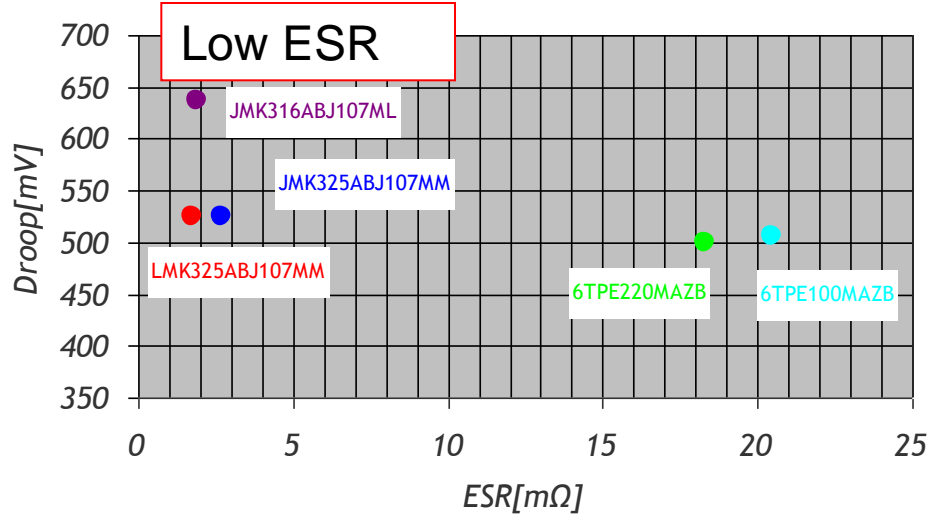
		Droop[mV]
POSCAP	6TPE220MAZB	500
	6TPE100MAZB	506
MLCC	LMK325ABJ107MM	525
	JMK325ABJ107MM	525
	JMK316ABJ107ML	638
	W/O	1061

	L	W	area	rate
POS	7.3	4.3	31.39	1
3225	3.2	2.5	8	1 / 4
3216	3.2	1.6	5.12	1 / 6

Capacitance @5V/Droop[mV]



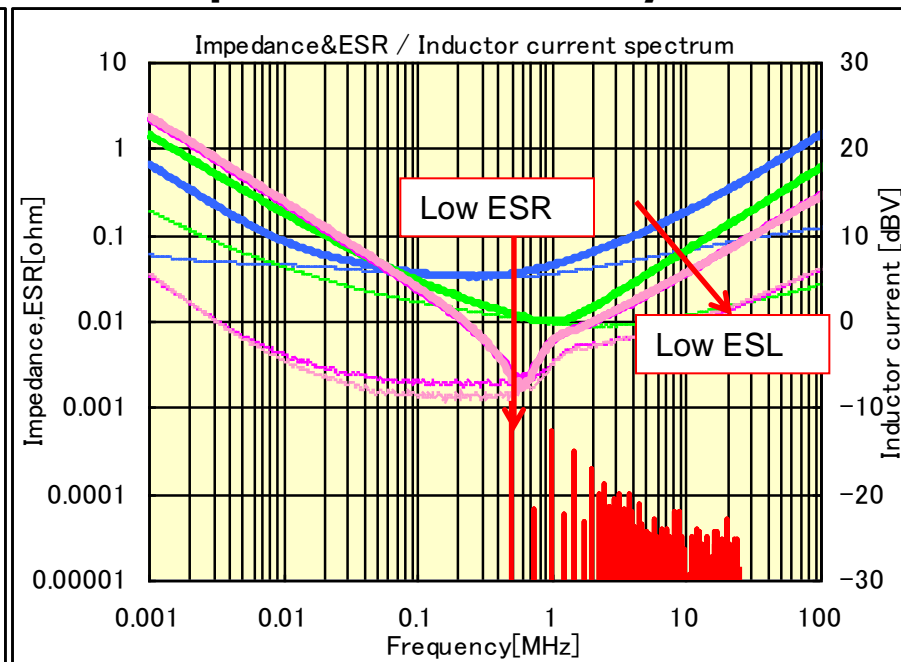
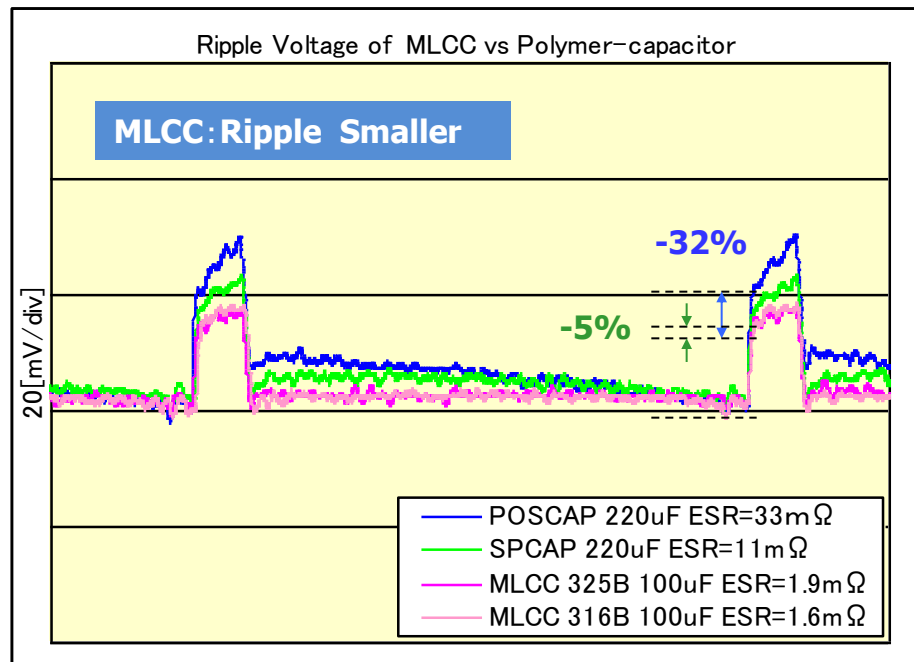
ESR[mΩ]/Droop[mV]



MLCC 100uF vs Polymer 220uF

Ripple Voltage: MLCC100uF < Polymer220uF

impedance: MLCC < Polymer



Spectrum of Inductor current

Electrolytic capacitor replacing

Guide line for MLCC replacement

○ Low Voltage (typically 1.5 V)

Ta Capacitor → 1/5 MLCC [uF]

Polymer C: → 1/2 MLCC [uF]

○ Higher Voltage

Ta Capacitor → 1/2 MLCC [uF]

Polymer C: → Same value

MLCC 100uF over Line up vs Polymer

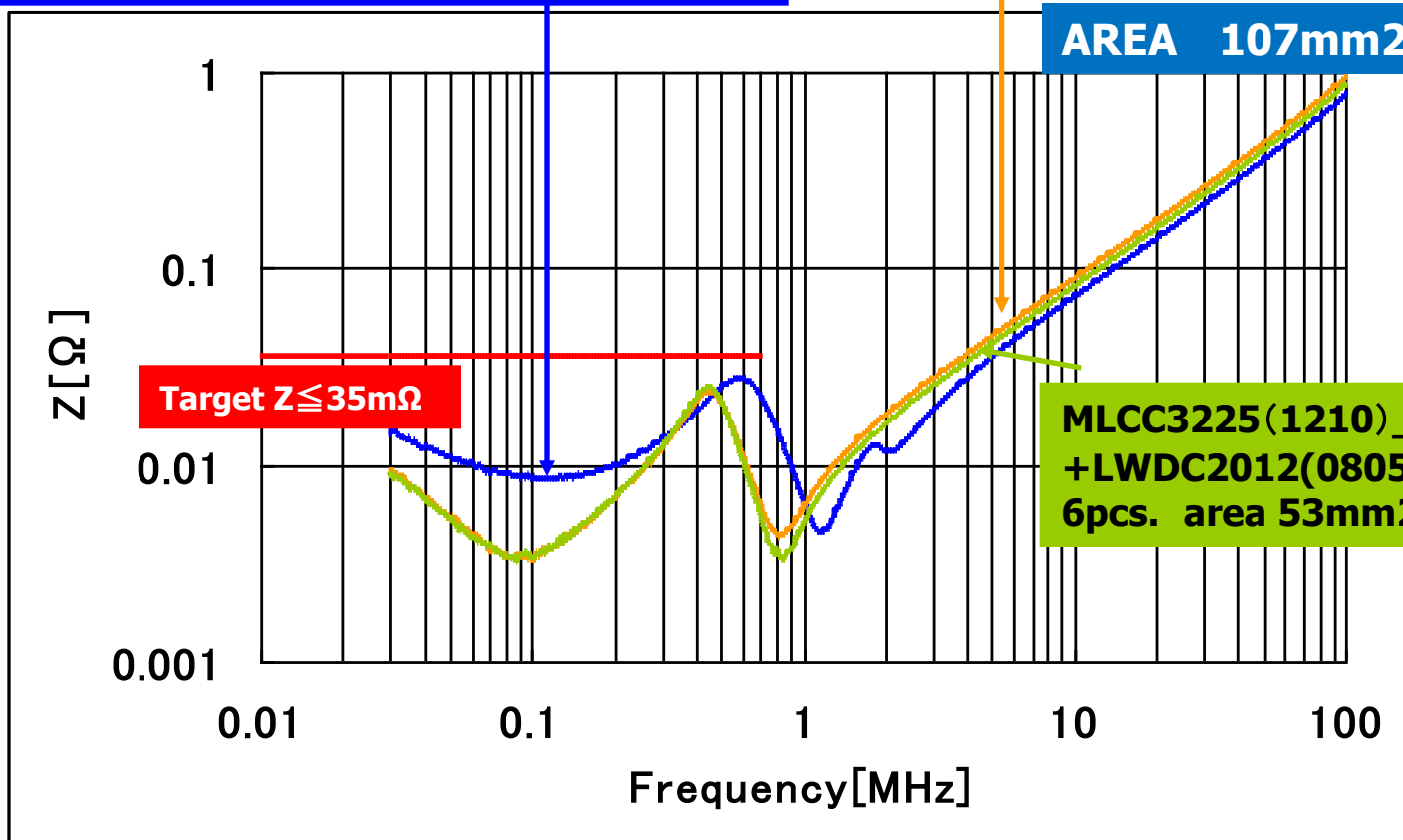
1V Bias

FPGA reference (Polymer 330uF) → MLCC 220uF

FPGA Reference
Polymer7343(2917)_330uF x 3pcs.
+MLCC2012(0805)_4.7uF x 5pcs.
8pcs. area 107mm²

MLCC3225(1210)_220uF x 4pcs.
+ MLCC1608(0603)_22uF x 2pcs.
6pcs. area 51mm²

AREA 107mm² → 51mm²



Target $Z \leq 35\text{m}\Omega$

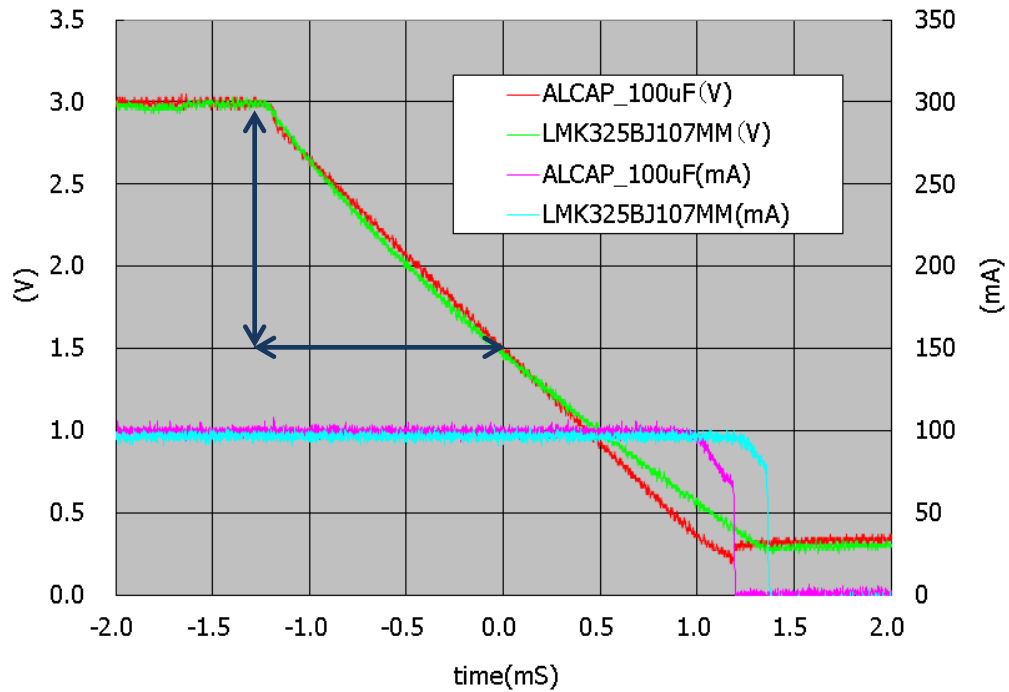
MLCC3225(1210)_220uF x 4pcs.
+LWDC2012(0805)_22uF x 2pcs.
6pcs. area 53mm²

LWDC: Low ESL MLCC0805_22uF_6.3v JWK212BJ226MD

MLCC1210_220uF_4.0v AMK325BBJ227MM

MLCC0603_22uF_6.3v JMK107BJ226MA

Back Up Time (momentary power interruption)



3V→1.5V time 1.3mS

**Same Capacitance
 → Same Back Up Time**

Equivalent to AL Cap

