Table 1: Quantitative comparison with SOTA methods.

Method	Bit	Set5 (×2)		Set14 (×2)		B100 (×2)		Urban100 (×2)		Manga109 (×2)	
		PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑
Baseline	32	38.15	0.9611	33.86	0.9206	32.31	0.9012	32.76	0.9340	39.11	0.9781
Bicubic	32	32.25	0.9118	29.25	0.8406	28.68	0.8104	25.96	0.8088	29.17	0.9128
OFQ†	4	37.380	0.958	32.908	0.912	31.689	0.893	30.485	0.911	37.462	0.974
PTQ4ViT	4	37.432	0.957	33.191	0.914	31.840	0.895	31.535	0.921	37.590	0.974
FQ-ViT	4	7.632	0.225	7.218	0.160	8.037	0.177	7.173	0.166	4.926	0.160
RepQ	4	37.885	0.960	33.467	0.917	32.075	0.898	31.981	0.927	38.370	0.976
NoisyQuant	4	37.499	0.957	33.061	0.910	31.728	0.894	31.305	0.920	37.468	0.972
2DQuant (Ours)	4	37.866	0.959	33.386	0.916	32.032	0.897	31.818	0.925	38.348	0.975
OFQ†	3	36.765	0.954	32.500	0.908	31.301	0.887	29.505	0.898	36.379	0.969
PTQ4ViT	3	36.486	0.951	32.487	0.905	31.270	0.885	30.157	0.903	36.413	0.967
RepQ	3	35.062	0.933	31.290	0.872	30.041	0.851	29.172	0.873	34.891	0.952
NoisyQuant	3	35.323	0.933	31.883	0.891	30.727	0.871	29.282	0.884	35.297	0.954
2DQuant (Ours)	3	37.323	0.957	32.855	0.911	31.597	0.891	30.449	0.909	37.236	0.972
OFQ†	2	35.194	0.945	31.538	0.897	30.584	0.877	28.028	0.872	33.081	0.954
PTQ4ViT	2	33.254	0.892	30.220	0.840	29.209	0.807	27.312	0.811	32.749	0.909
RepQ	2	31.651	0.833	29.192	0.779	28.267	0.741	26.555	0.746	30.464	0.827
NoisyQuant	2	30.127	0.762	28.801	0.756	28.259	0.742	26.683	0.763	30.399	0.820
2DQuant (Ours)	2	36.003	0.950	31.983	0.901	30.913	0.881	28.616	0.882	34.399	0.960

Method	Bit	Set5 (×3)		Set14 (×3)		B100 (×3)		Urban100 (×3)		Manga109 (×3)	
		PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑
OFQ†	4	33.246	0.915	29.639	0.829	28.568	0.791	26.766	0.820	31.584	0.928
PTQ4ViT	4	33.765	0.920	29.746	0.827	28.623	0.794	27.426	0.836	32.498	0.936
FQ-ViT	4	7.628	0.224	7.209	0.160	8.033	0.176	7.171	0.165	4.934	0.160
RepQ	4	34.077	0.923	30.044	0.834	28.884	0.801	27.874	0.846	32.981	0.940
NoisyQuant	4	33.130	0.912	29.064	0.809	27.932	0.775	26.664	0.814	31.942	0.929
2DQuant (Ours)	4	34.058	0.923	30.119	0.837	28.887	0.799	27.691	0.841	32.884	0.939
OFQ†	3	32.465	0.904	29.119	0.818	28.206	0.781	25.943	0.794	29.964	0.907
PTQ4ViT	3	32.753	0.903	29.138	0.811	28.062	0.771	26.434	0.801	31.200	0.913
RepQ	3	31.040	0.855	28.039	0.757	26.826	0.702	25.557	0.749	30.160	0.890
NoisyQuant	3	30.776	0.851	27.944	0.762	26.979	0.715	25.427	0.748	29.644	0.879
2DQuant (Ours)	3	33.245	0.913	29.565	0.826	28.498	0.787	26.646	0.812	31.460	0.923
OFQ†	2	31.305	0.884	28.333	0.801	27.720	0.765	25.071	0.761	27.998	0.874
PTQ4ViT	2	29.956	0.790	27.361	0.703	26.738	0.659	24.561	0.646	27.366	0.739
RepQ	2	27.317	0.648	25.633	0.592	25.438	0.565	23.419	0.558	24.512	0.572
NoisyQuant	2	27.525	0.664	25.771	0.595	25.372	0.561	23.59	0.574	26.032	0.663
2DQuant (Ours)	2	31.620	0.889	28.543	0.804	27.851	0.768	25.298	0.768	28.460	0.881

Method	Bit	Set5 (×4)		Set14 (×4)		B100 (×4)		Urban100 (×4)		Manga109 (×4)	
		PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑
OFQ†	4	31.019	0.874	27.862	0.763	27.084	0.719	24.963	0.745	28.457	0.877
PTQ4ViT	4	31.49	0.883	28.041	0.768	27.199	0.724	25.526	0.766	29.524	0.894
FQ-ViT	4	7.616	0.224	7.210	0.160	8.024	0.176	7.170	0.165	4.941	0.160
RepQ	4	31.767	0.888	28.323	0.775	27.399	0.731	25.834	0.778	29.877	0.901
NoisyQuant	4	31.086	0.875	27.753	0.759	26.910	0.715	25.074	0.750	28.962	0.882
2DQuant (Ours)	4	31.775	0.887	28.295	0.773	27.373	0.728	25.708	0.771	29.707	0.897
OFQ†	3	30.162	0.854	27.262	0.746	26.728	0.705	24.247	0.714	26.930	0.843
PTQ4ViT	3	29.768	0.834	27.003	0.725	26.210	0.674	24.224	0.698	27.939	0.848
RepQ	3	27.521	0.742	24.837	0.600	23.994	0.535	22.419	0.574	26.583	0.784
NoisyQuant	3	28.899	0.798	26.495	0.697	26.156	0.663	23.860	0.667	27.169	0.812
2DQuant (Ours)	3	30.905	0.870	27.748	0.757	26.989	0.713	24.851	0.736	28.211	0.868
OFQ†	2	29.150	0.827	26.593	0.725	26.326	0.688	23.592	0.680	25.610	0.803
PTQ4ViT	2	27.232	0.670	25.377	0.591	25.154	0.562	22.944	0.559	24.661	0.613
RepQ	2	25.547	0.583	23.541	0.475	23.301	0.430	21.622	0.449	23.602	0.556
NoisyQuant	2	25.935	0.586	24.330	0.507	24.156	0.472	22.317	0.484	23.822	0.540
2DQuant (Ours)	2	29.531	0.837	26.864	0.732	26.465	0.693	23.840	0.691	26.073	0.816

Table 2: Ablation study on calibration size.

Calibration Set Size	Bit	Set5 (×2)		Set14 (×2)		B100 (×2)		Urban100 (×2)		Manga109 (×2)	
		PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑
32	3	37.323	0.957	32.855	0.911	31.597	0.891	30.449	0.909	37.236	0.972
100	3	37.343	0.957	32.917	0.911	31.641	0.892	30.574	0.910	37.350	0.973
32	2	36.003	0.950	31.983	0.901	30.913	0.881	28.616	0.882	34.399	0.960
100	2	36.240	0.950	32.165	0.903	31.050	0.883	28.931	0.886	35.030	0.962

Calibration Set Size	Bit	Set5 (×4)		Set14 (×4)		B100 (×4)		Urban100 (×4)		Manga109 (×4)	
		PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑	PSNR↑	SSIM↑
32	3	30.905	0.870	27.748	0.757	26.989	0.713	24.851	0.736	28.211	0.868
100	3	30.944	0.870	27.793	0.757	27.021	0.713	24.902	0.737	28.218	0.867
32	2	29.531	0.837	26.864	0.732	26.465	0.693	23.840	0.691	26.073	0.816
100	2	29.815	0.843	27.028	0.736	26.569	0.696	24.012	0.698	26.398	0.823