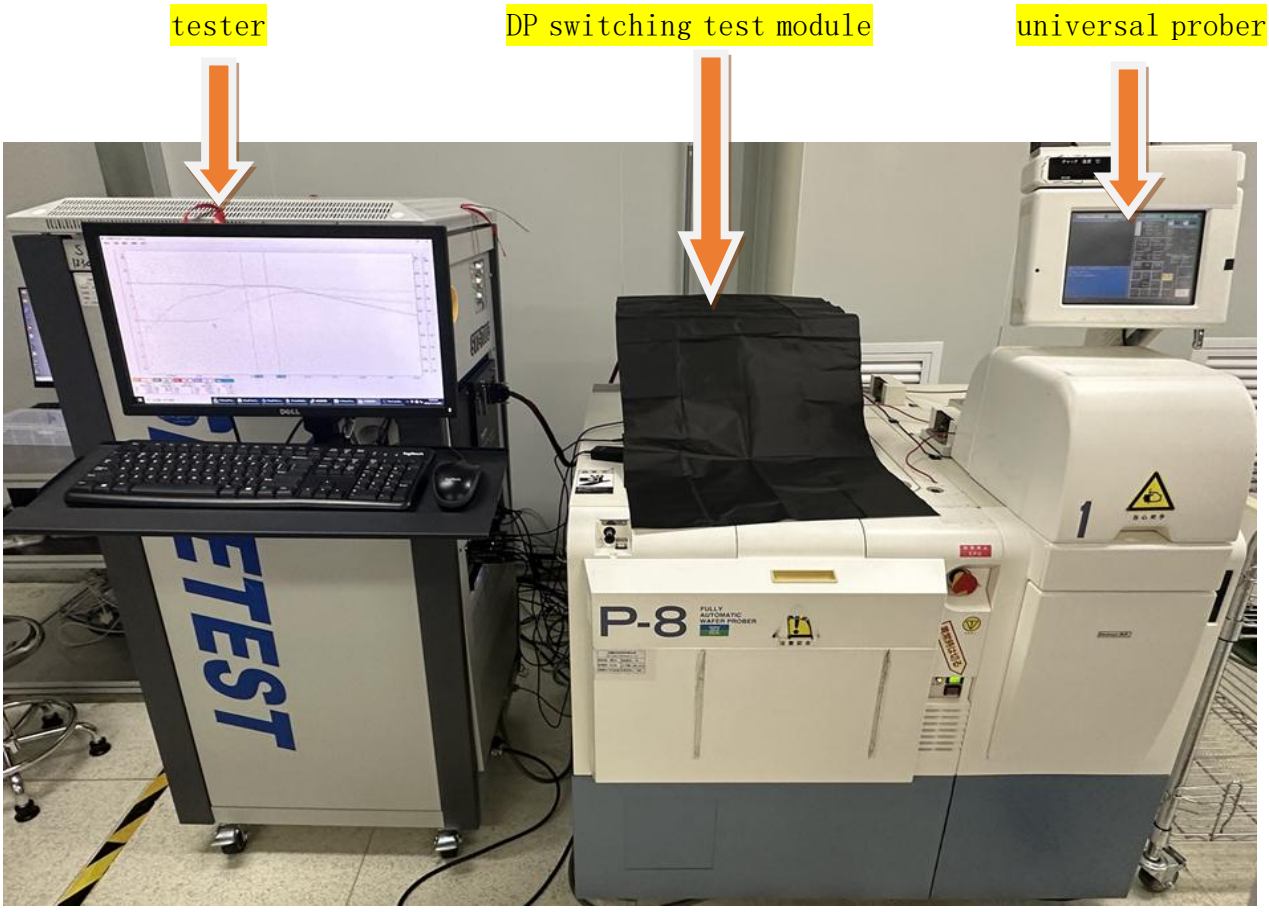
Real wafer level DC+Switching test solution for IGBT/SIC

SineTEST is the first in the industry to realize wafer-level switching parameter testing through patented technology. This breakthrough enables comprehensive characterization of power devices—including IGBT, SiC, and other advanced power semiconductors—directly on the full wafer. Both static and dynamic parameters (DC+UIL+Rg+Ton/Toff/Qg etc.,) can be completed in a single wafer-level test flow, delivering unprecedented efficiency and insight for power device manufacturers.

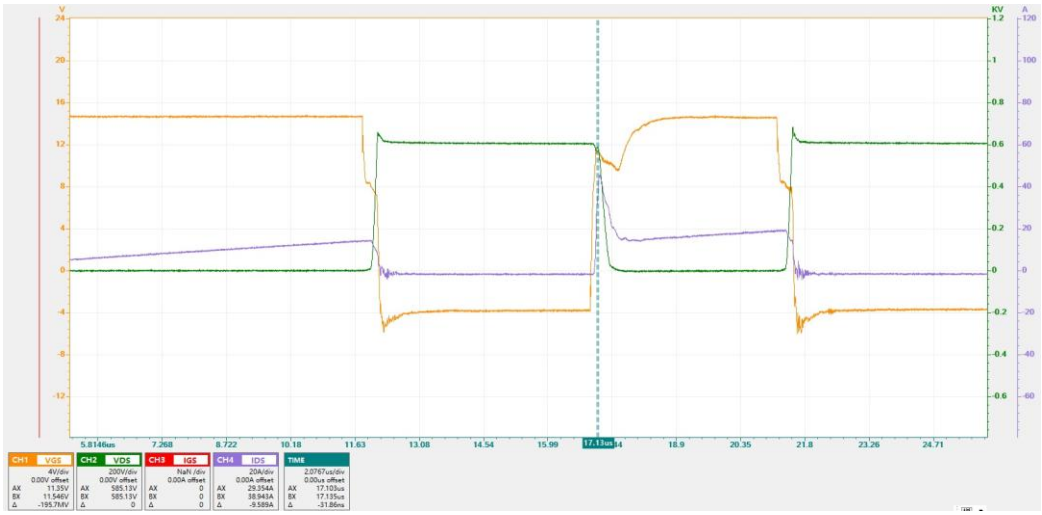
By moving dynamic switching parameter verification from the packaged device stage to the wafer stage(the solution achieves wafer-level switching parameter testing with parasitic inductance controlled below 45 nH), SineTEST empowers wafer fabs and design houses to identify switching performance issues much earlier in the development cycle. This allows new product designs to be validated faster and more accurately, significantly shortening time-to-market while effectively avoiding costly wafer scrap and packaging losses caused by late-stage performance failures.

For power module manufacturers, die-level consistency is critical. Traditional approaches require additional KGD testing after wafer-level DC testing, resulting in large, complex, and expensive test systems that slow production and increase costs. With SineTEST's wafer-level switching test solution, high-end power device wafers can be fully verified before shipment, ensuring consistent switching performance across dies and dramatically reducing downstream risks in module assembly.

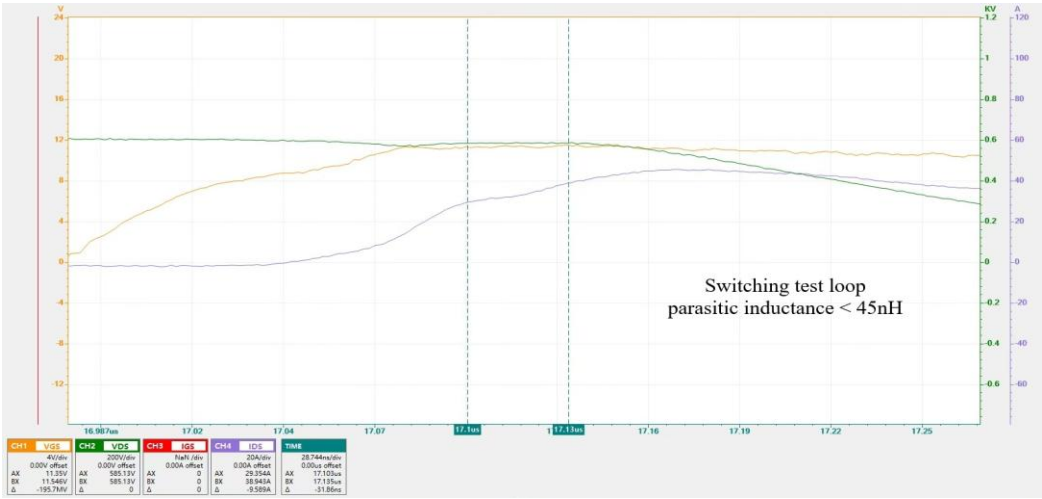
Introduction of the test solution (including production photos):



Double pulse switching test waveform：



Double pulse test waveform(for parastic inductance calculation)：



Part of production data(DC+SW)

	6.1	7.1	8.1	9.1	10.1	11.1	15.1	16.1	17.1	20.1	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8	33.9	33.1	33.11	33.12	33.13	33.14	33.15	33.16	33.17	33.18
Time/mS	Kelvin_G	Kelvin_D	Kelvin_S	ISGS_5V	VTH_250u	IGSS_25V	IDSS_600V	IDSS_1200	BVDSS_250	VDSON_2	SW_Ton_(	SW_Tr_ns	SW_Tdon_	SW_Eon_u	SW_Didtor	SW_Dvdto	SW_Toff_r	SW_Tf_ns	SW_Tdoff	SW_Eoff_(	SW_Dvdto	SW_Didtof	SW_Tz_ns	SW_Trr_ns	SW_Irm_a	SW_IDD_R	SW_Vpeak	SW_Vbus_
	0.02	0.02	0.02	0	5	-10	0	0	1320	0																		
	0.2	0.2	0.2	500	6.5	100	1	1	1800	1.8																		
	V	V	V	uA	V	nA	uA	uA	V	V	ns	ns	ns	uj	a/us	v/us	ns	ns	ns	uj	v/us	a/us	ns	ns	a	a	v	v
14541	0.1139	0.1117	0.1134	0.002	5.7419	15.4977	0.0843	0.1105	1435.5569	1.5983	100.8	33.6	67.2	1829.63	349.45	2194.37	390.4	185.6	204.8	279.52	4720.37	67.48	1.6	467.2	30.76	15.03	655.58	604.89
985	0.1139	0.1119	0.1134	0.012	5.728	24.9515	0.0844	0.111	1439.3898	1.4691	99.2	30.4	68.8	1821.31	373.36	2212.36	393.6	176	217.6	287.4	4678.81	70.05	3.2	467.2	31.22	15.11	655.58	605.47
1000	0.114	0.1121	0.1135	0.0057	5.6576	28.4208	0.0828	0.1092	1432.6085	1.4711	97.6	30.4	67.2	1757.09	392.68	2233.07	390.4	169.6	220.8	288.99	4678.81	64.62	3.2	459.2	32.16	15.26	655.58	605.57
988	0.114	0.1122	0.1134	0.0095	5.6368	28.5571	0.0821	0.1082	1432.1663	1.4709	97.6	28.8	68.8	1732.1	380.52	2260.87	393.6	174.4	219.2	289.14	4643.93	69.57	3.2	460.8	32.02	14.93	655.58	605.32
983	0.114	0.1121	0.1135	0.0095	5.6322	26.079	0.0828	0.1089	1439.1687	1.4468	97.6	30.4	67.2	1778.19	411.99	2288.66	395.2	179.2	216	285.84	4663.04	67.71	1.6	462.4	32.3	15.21	655.58	605.63
991	0.114	0.1121	0.1134	0.012	5.6371	26.2153	0.0826	0.1093	1444.3284	1.4316	96	27.2	68.8	1759.23	410.1	2271.46	393.6	174.4	219.2	292.94	4643.93	66.2	3.2	456	32.82	15.14	657.53	605.66
988	0.114	0.1119	0.1134	0.0095	5.654	27.6278	0.0832	0.1101	1427.6699	1.4175	97.6	28.8	68.8	1764.8	421.29	2270.13	400	177.6	222.4	298.35	4698.23	71.62	1.6	460.8	32.84	15.16	655.58	605.38
987	0.1139	0.1119	0.1134	0.0095	5.648	25.6949	0.083	0.1088	1429.66	1.4428	97.6	28.8	68.8	1793.37	414.49	2271.46	396.8	174.4	222.4	295.76	4643.93	66.2	1.6	457.6	33.05	15.37	657.53	605.53
978	0.1139	0.1119	0.1134	0.0071	5.6236	26.3145	0.0818	0.1085	1448.0139	1.4679	96	28.8	67.2	1748.53	407.7	2279.4	398.4	176	222.4	290.91	4663.04	68.94	1.6	454.4	32.75	15.07	659.49	605.73
975	0.114	0.1119	0.1134	0.0007	5.614	22.585	0.084	0.1083	1507.203	1.4767	96	28.8	67.2	1759.81	400.9	2279.4	396.8	176	220.8	289.47	4647.75	66.71	1.6	454.4	33	15.12	657.53	605.65
980	0.114	0.1121	0.1134	0.0031	5.6094	24.0842	0.0836	0.107	1500.6428	1.453	96	27.2	68.8	1746.07	410.1	2305.06	398.4	179.2	219.2	292.46	4666.57	69.89	1.6	457.6	33.15	15.08	657.53	605.71
984	0.1139	0.1119	0.1134	0.002	5.6094	23.1797	0.0834	0.1071	1478.8247	1.4334	96	27.2	68.8	1748.72	417.29	2324.81	396.8	174.4	222.4	292.96	4610.12	65.08	1.6	451.2	33.43	15.16	657.53	606.11
982	0.114	0.1119	0.1134	0.0006	5.613	23.0682	0.0826	0.1077	1472.2645	1.4559	96	27.2	68.8	1785.08	431.68	2295.65	398.4	180.8	217.6	290.57	4591.3	64.94	3.2	451.2	32.63	15.14	657.53	605.55
975	0.114	0.1119	0.1134	0.0071	5.6318	23.2788	0.0819	0.1063	1512.0679	1.4499	96	28.8	67.2	1797.06	394.11	2295.65	395.2	177.6	217.6	293	4624.82	68.32	3.2	452.8	32.3	15.2	655.58	605.49
985	0.114	0.1121	0.1135	0.0071	5.6223	23.9107	0.0828	0.1081	1506.2449	1.4443	96	27.2	68.8	1753.7	410.1	2283.74	395.2	172.8	222.4	279.53	4610.12	66.82	1.6	454.4	32.75	15.27	657.53	605.51
977	0.1139	0.1119	0.1134	0.0069	5.6292	21.9035	0.0832	0.1074	1502.7804	1.4821	96	27.2	68.8	1744.1	374.12	2287.46	395.2	184	211.2	283.21	4701.26	68.07	3.2	460.8	32.74	15.06	655.58	605.59
987	0.114	0.1122	0.1134	0.0018	5.6434	23.4151	0.0821	0.107	1469.6847	1.4805	97.6	28.8	68.8	1769.14	407.7	2306.14	393.6	172.8	220.8	289.22	4643.93	67.95	3.2	457.6	32.18	15.47	657.53	606.22
980	0.1139	0.1119	0.1134	0.012	5.727	22.6222	0.0818	0.1079	1531.8959	1.397	97.6	30.4	67.2	1758.48	386.24	2254.51	395.2	184	211.2	307.05	4698.23	67	1.6	465.6	32.52	15.43	655.58	604.9
984	0.114	0.1121	0.1134	0.0044	5.69	22.7956	0.0801	0.1074	1464.5986	1.5342	97.6	30.4	67.2	1815.49	399.11	2262.26	392	176	216	288.35	4701.26	66.71	1.6	467.2	32.03	15.14	655.58	605
981	0.114	0.1119	0.1134	0.012	5.6923	21.792	0.0815	0.106	1463.5667	1.5091	99.2	30.4	68.8	1852.72	366.93	2259.45	390.4	174.4	216	280.24	4663.04	70.69	1.6	468.8	31.62	15.11	655.58	605.84
981	0.114	0.1121	0.1134	0.0082	5.692	22.3496	0.0815	0.1068	1460.4708	1.5238	100.8	32	68.8	1789.77	379.16	2263.63	388.8	174.4	214.4	279.01	4678.81	67.33	3.2	468.8	31.47	15.16	657.53	605.53
139	0.1139	0.1119	0.1134	0.0247	0.1653																							
993	0.1139	0.1121	0.1134	0.0109	5.6494	11.0992	0.0811	0.1083	1468.2104	1.575	99.2	32	67.2	1783.59	366.93	2268.79	390.4	176	214.4	277.4	4682.15	70.05	1.6	462.4	31.58	15.07	655.58	605.77
986	0.114	0.1119	0.1135	0.0044	5.6715	21.9407	0.0821	0.107	1465.9254	1.5215	99.2	30.4	68.8	1782.67	373.36	2262.26	392	179.2	212.8	281.74	4643.93	68.8	3.2	460.8	31.77	15.07	657.53	606.09
991	0.1139	0.1119	0.1134	0.0095	5.6785	23.3036	0.0814	0.1071	1471.6748	1.4849	99.2	30.4	68.8	1809.66	366.93	2296.8	393.6	174.4	219.2	284.72	4698.23	66.2	1.6	472	31.76	15.05	657.53	605.48
983	0.1139	0.1122	0.1135	0.0069	5.6804	24.0099	0.0815	0.1067	1509.4143	1.4752	99.2	30.4	68.8	1852.35	392.68	2279.4	393.6	174.4	219.2	286.15	4717.64	69.57	1.6	459.2	31.88	15.18	657.53	605.98
983	0.114	0.1119	0.1134	0.0107	5.6623	23.316	0.0818	0.1066	1510.8148	1.5074	97.6	30.4	67.2	1819.53	373.36	2253.06	393.6	174.4	219.2	289.72	4605.71	68.45	1.6	452.8	32.39	15.1	657.53	606
980	0.114	0.1121	0.1134	0.0044	5.688	24.1462	0.0807	0.107	1533.5176	1.3782	97.6	27.2	70.4	1768.12	402.5	2288.66	400	182.4	217.6	330.07	4503.2	65.45	1.6	454.4	32.88	15.2	655.58	605.98
990	0.114	0.1121	0.1135	0.0158	5.6414	24.4931	0.0818	0.1074	1506.0237	1.4871	97.6	27.2	70.4	1787.15	417.29	2267.42	395.2	176	219.2	279.89	4628.93	68.94	1.6	457.6	31.88	15.56	657.53	605.74
981	0.1139	0.1119	0.1134	0.0044	5.6209	23.6753	0.0819	0.1078	1509.783	1.4512	97.6	28.8	68.8	1793.74	400.9	2305.06	395.2	176	219.2	279.21	4682.15	68.94	3.2	454.4	31.93	15.04	657.53	606.11
995	0.1139	0.1121	0.1134	0.0069	5.6107	24.7037	0.0821	0.1086	1513.321	1.4801	96	30.4	65.6	1747.35	386.24	2315.47	396.8	176	220.8	281.46	4647.75	67.83	1.6	459.2	32.39	15.1	657.53	605.67
982	0.114	0.1119	0.1135	0.0095	5.6117	26.1038	0.0811	0.1081	1515.2374	1.458	97.6	28.8	68.8	1826.63	380.52	2287.46	398.4	174.4	224	285	4663.04	66.2	1.6	452.8	32.24	15.14	657.53	605.73
439	0.114	0.1121	0.1134	0.0095	5.6008	24.0594	4.5088																					
987	0.114	0.1119	0.1134	0.0147	5.5998	12.7471	0.0818	0.1075	1504.1072	1.5484	96	28.8	67.2	1758.7	394.11	2286.24	396.8	176	220.8	289.82	4586.59	63.38	3.2	459.2	32.82	15.34	659.49	605.46
991	0.114	0.1119	0.1134	0.0018	5.5945	23.093	0.0834	0.1081	1511.036	1.4805	96	27.2	68.8	1718.38	424.48	2323.87	396.8	176	220.8	289.41	4610.12	65.6	3.2	449.6	33.45	15.38	657.53	605.9
981	0.114	0.1121	0.1134	0.0031	5.5909	24.6418	0.0823	0.1085	1514.4266	1.4692	96	28.8	67.2	1727.62	421.29	2307.2	400	174.4	225.6	292.93	4572.48	63.96	3.2	459.2	33.53	15.07	659.49	606.08
990	0.114	0.1119	0.1134	0.0107	5.5836	25.5339	0.081	0.1078	1441.38	1.4719	96	28.8	67.2	1769.1	421.29	2315.47	398.4	180.8	217.6	293.78	4572.48	66.03	1.6	451.2	33.3	15.22	657.53	605.99

If you want to understand more details, please contact us!