TOSHIBA ZENZER DIODE SILICON EPITAXIAL PLANAR TYPE

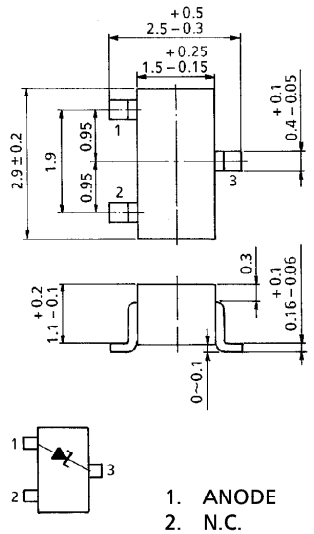
02CZ2.0~02CZ47

CONSTANT VOLTAGE REGULATION APPLICATIONS.

REFERENCE VOLTAGE APPLICATIONS.

- Small Package : SC-59
- Nominal Voltage Tolerance About ±2.5% (4.3V~24V)

Unit in mm



1. ANODE
2. N.C.
3. CATHODE

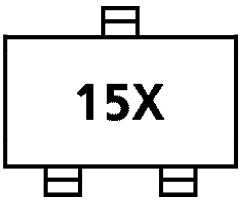
S-MINI	
JEDEC	TO-236MOD
EIAJ	SC-59
TOSHIBA	1-3G1B

Weight : 0.012g

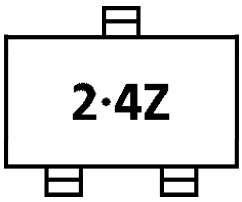
MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Dissipation	P	200	mW
Junction Temperature	T_j	150	°C
Storage Temperature Range	T_{stg}	−55~150	°C

MARKING



(02CZ15-X)



(02CZ2.4-Z)

961001EAA2

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ELECTRICAL CHARACTERISTICS (Ta = 25°C)

TYPE No.	ZENER VOLTAGE (*) V_Z (V)			DYNAMIC IMPEDANCE		KNEE DYNAMIC IMPEDANCE		REVERSE CURRENT	
	MIN.	MAX.	I_Z (mA)	Z_Z (Ω) MAX.	I_Z (mA)	Z_{ZK} (Ω) MAX.	I_Z (mA)	I_R (μA) MAX.	V_R (V)
02CZ2.0 (**)	1.85	2.15	5	100	5	1000	0.5	120	1.0
02CZ2.2 (**)	2.05	2.38	5	100	5	1000	0.5	120	1.0
02CZ2.4	2.28	2.60	5	100	5	1000	0.5	120	1.0
02CZ2.7	2.50	2.90	5	110	5	1000	0.5	120	1.0
02CZ3.0	2.80	3.20	5	120	5	1000	0.5	50	1.0
02CZ3.3	3.10	3.50	5	130	5	1000	0.5	20	1.0
02CZ3.6	3.40	3.80	5	130	5	1000	0.5	10	1.0
02CZ3.9	3.70	4.10	5	130	5	1000	0.5	10	1.0
02CZ4.3	4.00	4.50	5	130	5	1000	0.5	5	1.0
02CZ4.7	4.40	4.90	5	120	5	1000	0.5	5	1.0
02CZ5.1	4.80	5.40	5	70	5	1000	0.5	1	1.5
02CZ5.6	5.30	6.00	5	40	5	900	0.5	1	2.5
02CZ6.2	5.80	6.60	5	30	5	500	0.5	1	3.0
02CZ6.8	6.40	7.20	5	25	5	150	0.5	0.5	5.0
02CZ7.5	7.00	7.90	5	23	5	120	0.5	0.5	6.0
02CZ8.2	7.70	8.70	5	20	5	120	0.5	0.5	6.5
02CZ9.1	8.50	9.60	5	18	5	120	0.5	0.5	7.0
02CZ10	9.40	10.60	5	15	5	120	0.5	0.5	8.0
02CZ11	10.40	11.60	5	15	5	120	0.5	0.5	8.5
02CZ12	11.40	12.60	5	15	5	110	0.5	0.5	9.0
02CZ13	12.40	14.10	5	15	5	110	0.5	0.5	10
02CZ15	13.80	15.60	5	15	5	110	0.5	0.5	11
02CZ16	15.30	17.10	5	18	5	150	0.5	0.5	12
02CZ18	16.80	19.10	5	20	5	150	0.5	0.5	14
02CZ20	18.80	21.20	5	25	5	200	0.5	0.5	15
02CZ22	20.80	23.30	5	30	5	200	0.5	0.5	17
02CZ24	22.80	25.60	5	40	5	200	0.5	0.5	19
02CZ27	25.10	28.90	2	70	2	250	0.5	0.5	21
02CZ30	28.00	32.00	2	80	2	250	0.5	0.5	23
02CZ33	31.00	35.00	2	80	2	250	0.5	0.5	25
02CZ36	34.00	38.00	2	90	2	250	0.5	0.5	27
02CZ39	37.00	41.00	2	100	2	250	0.5	0.5	30
02CZ43	40.00	45.00	2	130	2	—	—	0.5	33
02CZ47	44.00	49.00	2	150	2	—	—	0.5	36

(*) Test time : t=30ms (**) Product by order

ZENER VOLTAGE CLASSIFICATION

TYPE No.		ZENER VOLTAGE V_Z (V) t=30ms					
		REFERENCE					
		I_Z=0.5mA		I_Z=1mA		I_Z=5mA	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
02CZ2.0-X	X	1.28	1.46	1.40	1.62	1.85	2.05
02CZ2.0-Z	Z	1.38	1.52	1.52	1.69	1.95	2.15
02CZ2.2-X	X	1.45	1.60	1.59	1.78	2.05	2.26
02CZ2.2-Z	Z	1.52	1.67	1.68	1.92	2.16	2.38
02CZ2.4-X	X	1.64	1.81	1.82	2.03	2.28	2.50
02CZ2.4-Z	Z	1.72	1.89	1.87	2.10	2.40	2.60
02CZ2.7-X	X	1.81	2.00	2.00	2.21	2.50	2.75
02CZ2.7-Z	Z	1.92	2.12	2.11	2.33	2.65	2.90
02CZ3.0-X	X	2.04	2.23	2.23	2.46	2.80	3.05
02CZ3.0-Z	Z	2.16	2.35	2.36	2.58	2.95	3.20
02CZ3.3-X	X	2.27	2.47	2.48	2.73	3.10	3.35
02CZ3.3-Z	Z	2.39	2.60	2.63	2.86	3.25	3.50
02CZ3.6-X	X	2.51	2.74	2.76	3.00	3.40	3.65
02CZ3.6-Z	Z	2.65	2.89	2.90	3.16	3.55	3.80
02CZ3.9-X	X	2.79	3.06	3.06	3.33	3.70	3.97
02CZ3.9-Z	Z	2.95	3.20	3.23	3.46	3.87	4.10
02CZ4.3-X	X	3.06	3.35	3.36	3.63	4.00	4.23
02CZ4.3-Y	Y	3.23	3.46	3.53	3.75	4.13	4.35
02CZ4.3-Z	Z	3.35	3.72	3.65	3.93	4.25	4.50
02CZ4.7-X	X	3.56	3.92	3.83	4.10	4.40	4.63
02CZ4.7-Y	Y	3.74	4.05	4.00	4.25	4.53	4.76
02CZ4.7-Z	Z	3.90	4.22	4.15	4.44	4.66	4.90
02CZ5.1-X	X	4.08	4.48	4.34	4.66	4.80	5.07
02CZ5.1-Y	Y	4.32	4.73	4.56	4.90	4.97	5.24
02CZ5.1-Z	Z	4.56	4.96	4.80	5.12	5.14	5.40
02CZ5.6-X	X	4.80	5.36	5.02	5.43	5.30	5.63
02CZ5.6-Y	Y	5.00	5.63	5.23	5.65	5.43	5.81
02CZ5.6-Z	Z	5.30	5.90	5.45	5.90	5.61	6.00

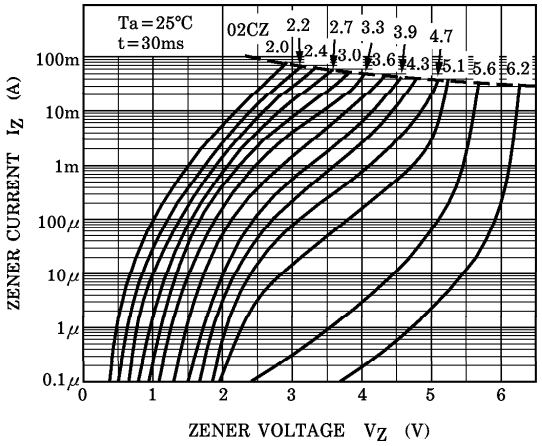
ZENER VOLTAGE CLASSIFICATION

TYPE No.		ZENER VOLTAGE V_Z (V) t=30ms					
		REFERENCE					
		I_Z=0.5mA		I_Z=1mA		I_Z=5mA	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
02CZ6.2-X	X	5.60	6.12	5.70	6.13	5.80	6.20
02CZ6.2-Y	Y	5.89	6.34	5.93	6.35	6.00	6.39
02CZ6.2-Z	Z	6.12	6.57	6.15	6.58	6.19	6.60
02CZ6.8-X	X	6.35	6.80	6.38	6.80	6.40	6.80
02CZ6.8-Y	Y	6.59	7.02	6.60	7.02	6.60	7.02
02CZ6.8-Z	Z	6.81	7.20	6.82	7.20	6.82	7.20
02CZ7.5-X	X	6.96	7.43	6.97	7.43	7.00	7.43
02CZ7.5-Y	Y	7.19	7.66	7.20	7.66	7.23	7.66
02CZ7.5-Z	Z	7.42	7.90	7.43	7.90	7.46	7.90
02CZ8.2-X	X	7.66	8.16	7.67	8.16	7.70	8.16
02CZ8.2-Y	Y	7.92	8.43	7.93	8.43	7.96	8.43
02CZ8.2-Z	Z	8.19	8.70	8.20	8.70	8.23	8.70
02CZ9.1-X	X	8.46	9.00	8.47	9.00	8.50	9.00
02CZ9.1-Y	Y	8.76	9.30	8.77	9.30	8.80	9.30
02CZ9.1-Z	Z	9.06	9.60	9.07	9.60	9.10	9.60
02CZ10-X	X	9.36	9.93	9.37	9.93	9.40	9.93
02CZ10-Y	Y	9.69	10.26	9.70	10.26	9.73	10.26
02CZ10-Z	Z	10.02	10.60	10.03	10.60	10.06	10.60
02CZ11-X	X	10.34	10.95	10.36	10.96	10.40	10.98
02CZ11-Y	Y	10.67	11.23	10.69	11.24	10.73	11.26
02CZ11-Z	Z	11.00	11.57	11.02	11.58	11.06	11.60
02CZ12-X	X	11.34	11.90	11.36	11.91	11.40	11.93
02CZ12-Y	Y	11.67	12.23	11.69	12.24	11.73	12.26
02CZ12-Z	Z	12.00	12.57	12.02	12.58	12.06	12.60
02CZ13-X	X	12.34	13.05	12.36	13.06	12.40	13.08
02CZ13-Y	Y	12.82	13.54	12.84	13.55	12.88	13.57
02CZ13-Z	Z	13.31	14.07	13.33	14.08	13.37	14.10

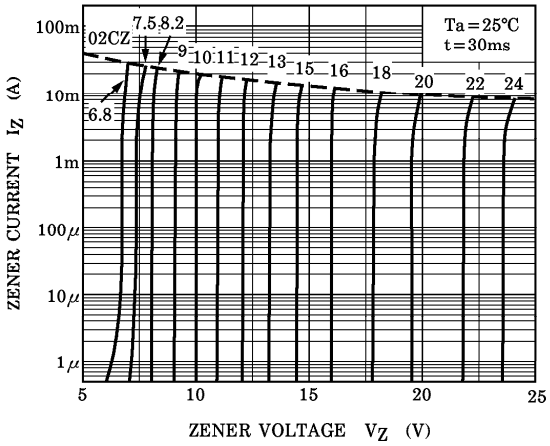
ZENER VOLTAGE CLASSIFICATION

TYPE No.		ZENER VOLTAGE V_Z (V) t=30ms					
		REFERENCE					
		I_Z=0.5mA		I_Z=1mA		I_Z=5mA	
		MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
02CZ15-X	X	13.74	14.60	13.76	14.61	13.80	14.63
02CZ15-Y	Y	14.27	15.08	14.29	15.09	14.33	15.11
02CZ15-Z	Z	14.75	15.54	14.77	15.56	14.81	15.60
02CZ16-X	X	15.15	16.04	15.18	16.06	15.30	16.10
02CZ16-Y	Y	15.65	16.54	15.68	16.56	15.80	16.60
02CZ16-Z	Z	16.15	17.04	16.18	17.06	16.30	17.10
02CZ18-X	X	16.65	17.70	16.68	17.72	16.80	17.76
02CZ18-Y	Y	17.31	18.37	17.34	18.39	17.46	18.43
02CZ18-Z	Z	17.98	19.04	18.01	19.06	18.13	19.10
02CZ20-X	X	18.65	19.72	18.68	19.74	18.80	19.78
02CZ20-Y	Y	19.33	20.40	19.36	20.42	19.48	20.46
02CZ20-Z	Z	19.97	21.14	20.01	21.16	20.16	21.20
02CZ22-X	X	20.61	21.82	20.65	21.84	20.80	21.88
02CZ22-Y	Y	21.29	22.50	21.33	22.52	21.48	22.56
02CZ22-Z	Z	21.97	23.24	22.01	23.26	22.16	23.30
02CZ24-X	X	22.61	24.05	22.65	24.07	22.80	24.11
02CZ24-Y	Y	23.42	24.86	23.46	24.88	23.61	24.92
02CZ24-Z	Z	24.23	25.54	24.27	25.56	24.42	25.60

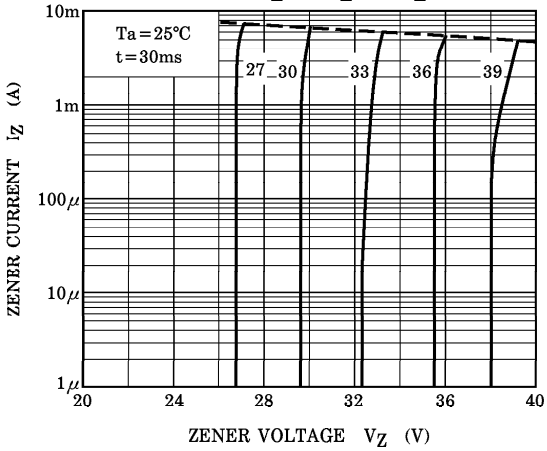
$I_Z - V_Z$ (V_Z : 2.0~6.2)



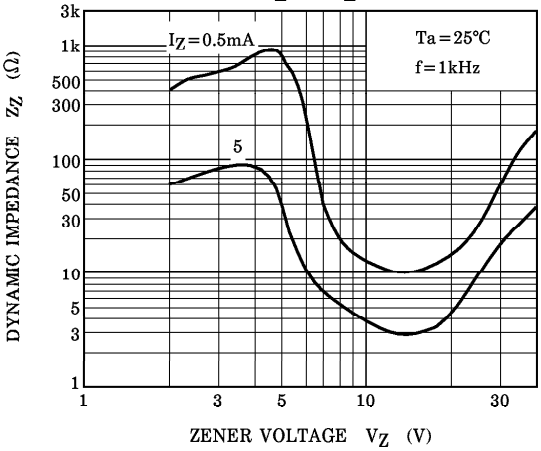
$I_Z - V_Z$ (V_Z : 6.8~24)



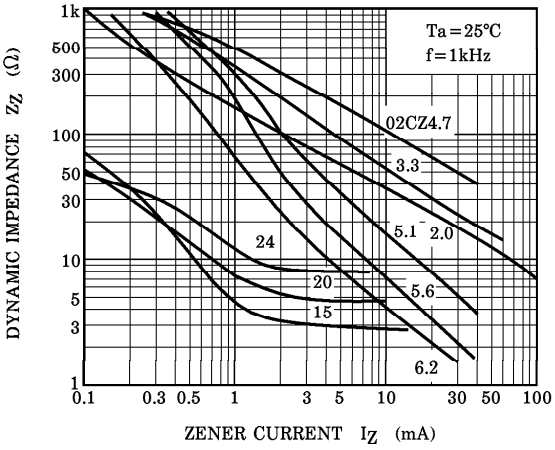
$I_Z - V_Z$ (V_Z : 27~39)



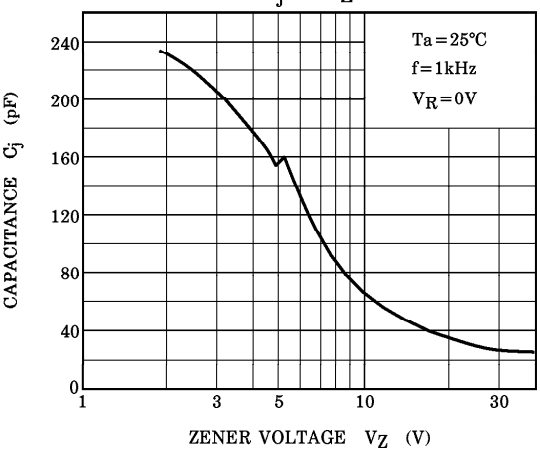
$Z_Z - V_Z$

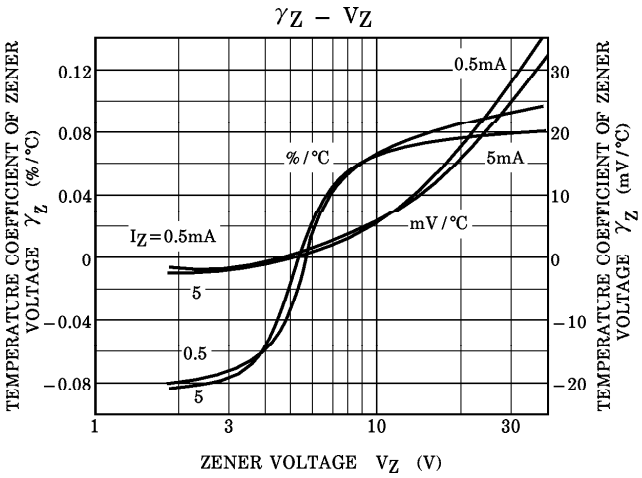


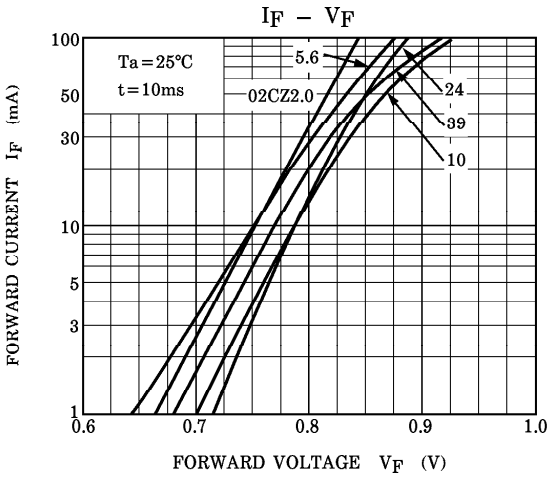
$Z_Z - I_Z$

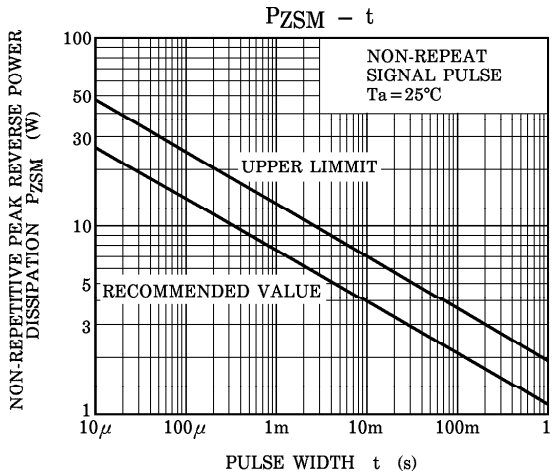


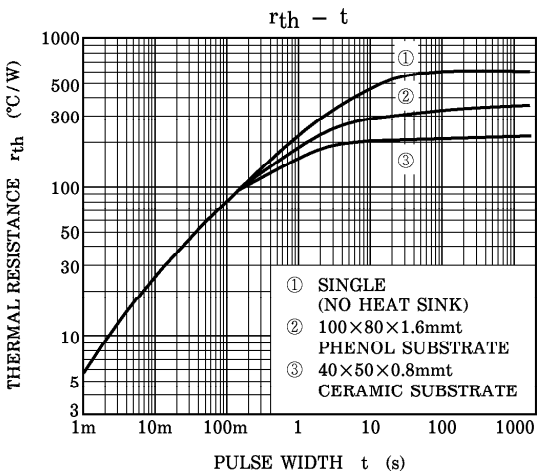
$C_j - V_Z$

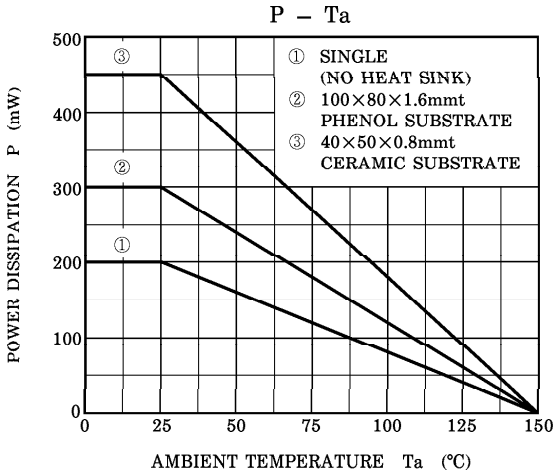



γZ – VZ
TEMPERATURE COEFFICIENT OF ZENER VOLTAGE γZ (%/°C)
TEMPERATURE COEFFICIENT OF ZENER VOLTAGE γZ (mV/°C)
0.12
0.08
0.04
0
−0.04
−0.08
30
20
10
0
−10
−20
0.5mA
5mA
%/°C
mV/°C
IZ=0.5mA
5
0.5
5
1
3
10
30
ZENER VOLTAGE VZ (V)


IF – VF
FORWARD CURRENT IF (mA)
100
50
30
10
5
3
1
Ta=25°C
t=10ms
5.6
02CZ2.0
24
39
10
0.6
0.7
0.8
0.9
1.0
FORWARD VOLTAGE VF (V)


PZSM – t
NON-REPETITIVE PEAK REVERSE POWER DISSIPATION PZSM (W)
100
50
30
10
5
3
1
NON-REPEAT
SIGNAL PULSE
Ta=25°C
UPPER LIMMIT
RECOMMENDED VALUE
10μ
100μ
1m
10m
100m
1
PULSE WIDTH t (s)


rth – t
THERMAL RESISTANCE rth (°C/W)
1000
500
300
100
50
30
10
5
3
①
②
③
① SINGLE
(NO HEAT SINK)
② 100×80×1.6mmt
PHENOL SUBSTRATE
③ 40×50×0.8mmt
CERAMIC SUBSTRATE
1m
10m
100m
1
10
100
1000
PULSE WIDTH t (s)


P – Ta
POWER DISSIPATION P (mW)
500
400
300
200
100
0
③
②
①
① SINGLE
(NO HEAT SINK)
② 100×80×1.6mmt
PHENOL SUBSTRATE
③ 40×50×0.8mmt
CERAMIC SUBSTRATE
0
25
50
75
100
125
150
AMBIENT TEMPERATURE Ta (°C)

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