

# International IOR Rectifier

## 30WQ10FN

SCHOTTKY RECTIFIER

3.5 Amp

$$I_{F(AV)} = 3.5\text{Amp}$$

$$V_R = 100\text{V}$$

### Major Ratings and Characteristics

Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	3.5	A
$V_{RRM}$	100	V
$I_{FSM}$ @tp = 5 $\mu$ s sine	440	A
$V_F$ @3 Apk, $T_J = 125^\circ\text{C}$	0.63	V
$T_J$	-40 to 150	$^\circ\text{C}$

### Description/ Features

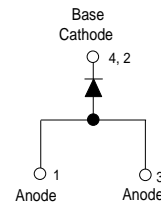
The 30WQ10FN surface mount Schottky rectifier has been designed for applications requiring low forward drop and small foot prints on PC board. Typical applications are in disk drives, switching power supplies, converters, free-wheeling diodes, battery charging, and reverse battery protection.

- Popular D-PAK outline
- Small foot print, surface mountable
- Low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

### Case Styles



D-PAK (TO-252AA)



## Voltage Ratings

Part number	30WQ10FN
$V_R$ Max. DC Reverse Voltage (V)	100
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)	

## Absolute Maximum Ratings

Parameters	30WQ...	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current * See Fig. 5	3.5	A	50% duty cycle @ $T_C = 135^\circ\text{C}$ , rectangular wave form
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current * See Fig. 7	440	A	Following any rated load condition and with rated $V_{RRM}$ applied
	70		
$E_{AS}$ Non-Repetitive Avalanche Energy	5.0	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1$ Amp, $L = 10$ mH
$I_{AR}$ Repetitive Avalanche Current	0.5	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical

## Electrical Specifications

Parameters	30WQ...	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop * See Fig. 1 (1)	0.81	V	@ 3A
	0.96	V	@ 6A
	0.63	V	@ 3A
	0.74	V	@ 6A
$I_{RM}$ Max. Reverse Leakage Current * See Fig. 2 (1)	1	mA	$T_J = 25^\circ\text{C}$
	4.9	mA	$T_J = 125^\circ\text{C}$
$V_{F(TO)}$ Threshold Voltage	0.48	V	$T_J = T_J$ max.
$r_t$ Forward Slope Resistance	30.89	m $\Omega$	
$C_T$ Typical Junction Capacitance	92	pF	$V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$
$L_S$ Typical Series Inductance	5.0	nH	Measured lead to lead 5mm from package body
dv/dt Max. Voltage Rate of Change	10000	V/ $\mu\text{s}$	(Rated $V_R$ )

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle < 2%

## Thermal-Mechanical Specifications

Parameters	30WQ...	Units	Conditions
$T_J$ Max. Junction Temperature Range(*)	-40 to 150	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-40 to 150	$^\circ\text{C}$	
$R_{thJC}$ Max. Thermal Resistance Junction to Case	4.7	$^\circ\text{C/W}$	DC operation * See Fig. 4
wt Approximate Weight	0.3(0.01)	g(oz.)	
Case Style	D-PAK		Similar to TO-252AA
Marking Device	30WQ10FN		

(\*)  $\frac{dP_{tot}}{dT_J} < \frac{1}{R_{th(j-a)}}$  thermal runaway condition for a diode on its own heatsink

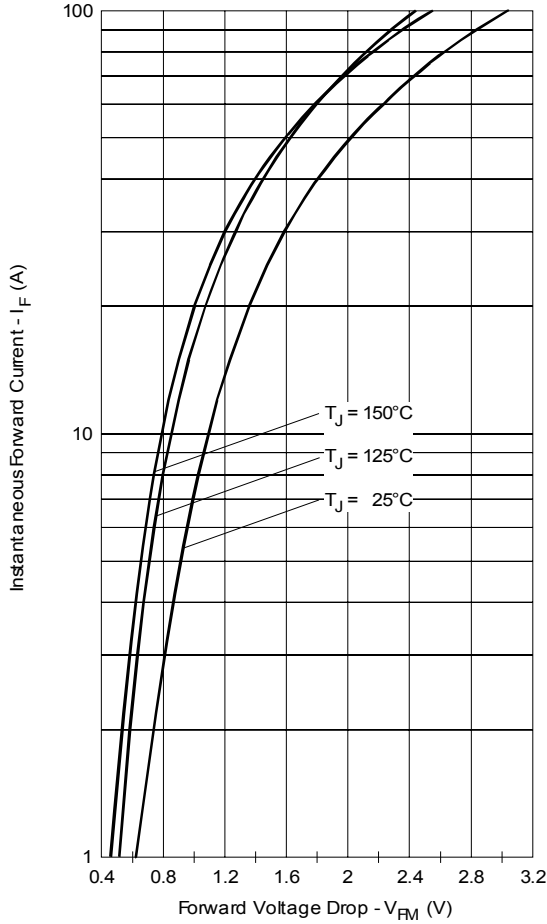


Fig. 1 - Maximum Forward Voltage Drop Characteristics

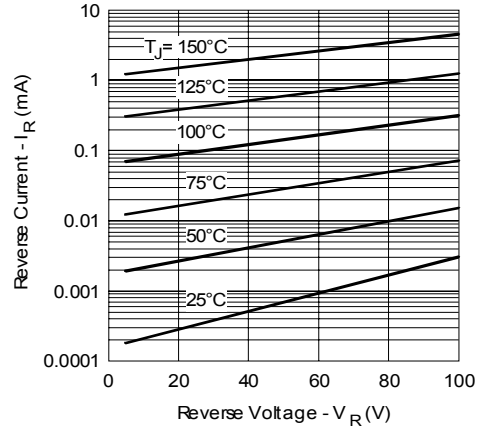


Fig. 2 - Typical Values of Reverse Current Vs. Reverse Voltage

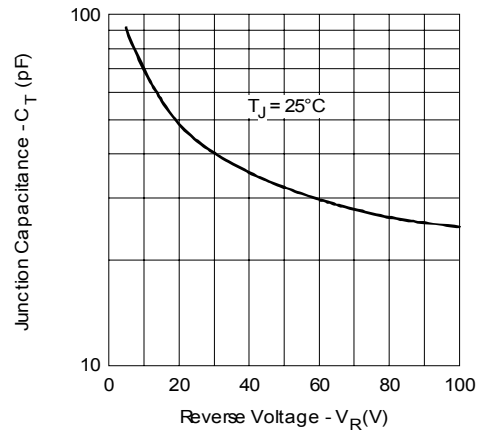


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage

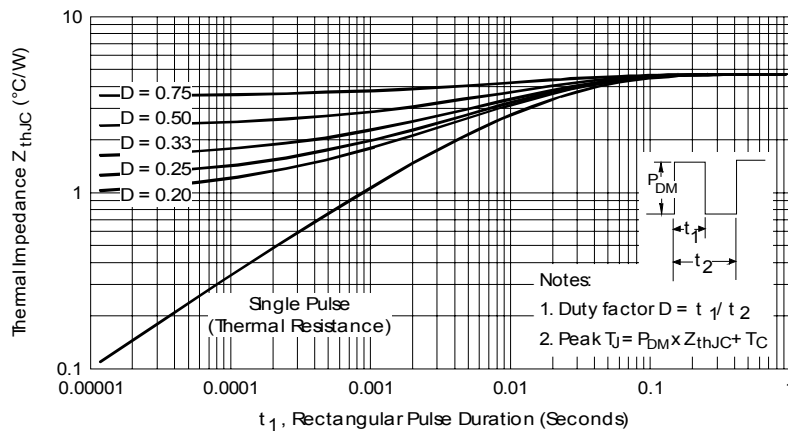


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

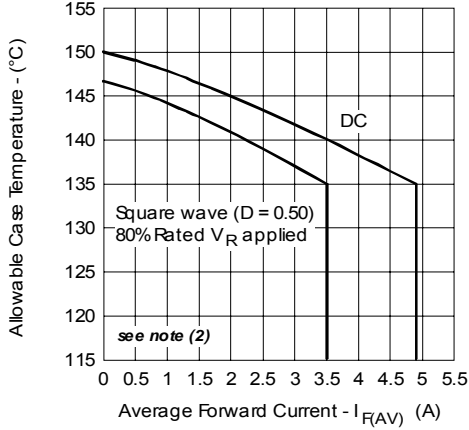


Fig. 5 - Maximum Allowable Case Temperature Vs. Average Forward Current

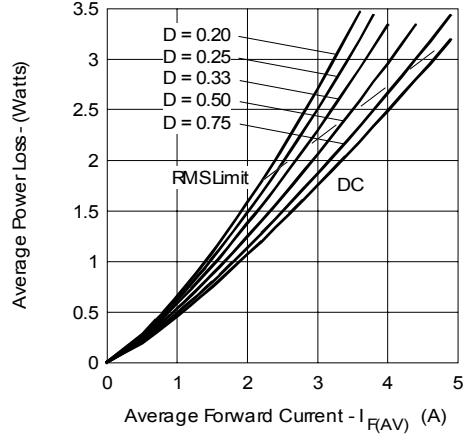


Fig. 6 - Forward Power Loss Characteristics

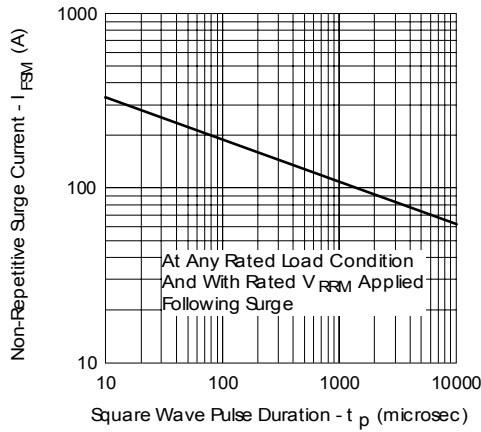


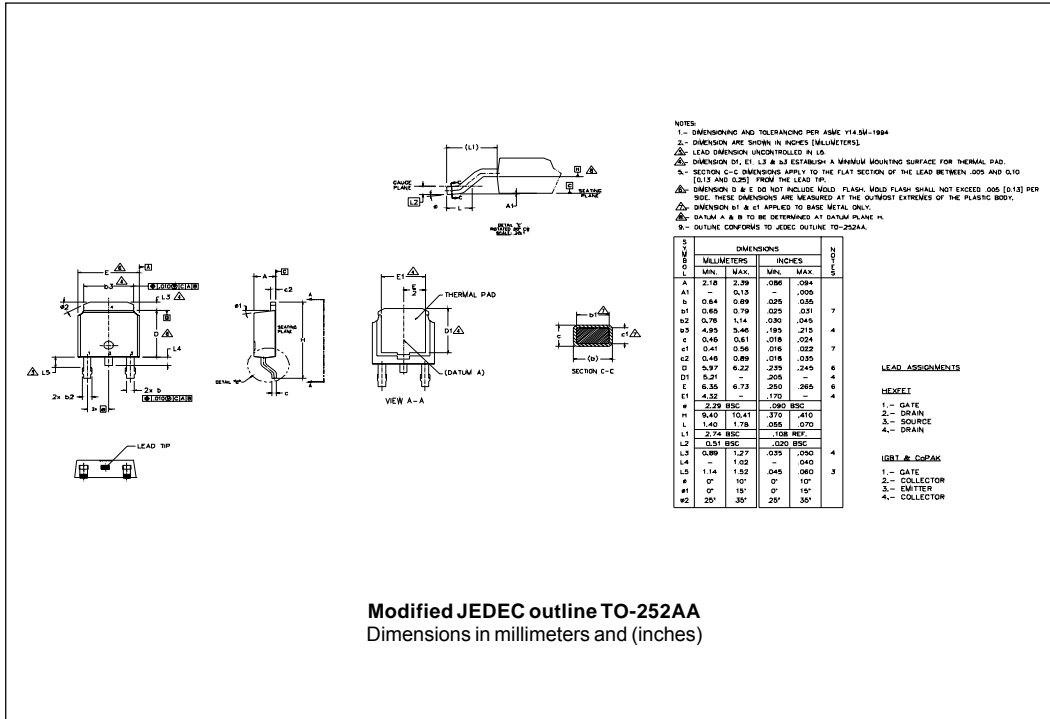
Fig. 7 - Maximum Non-Repetitive Surge Current

(2) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;

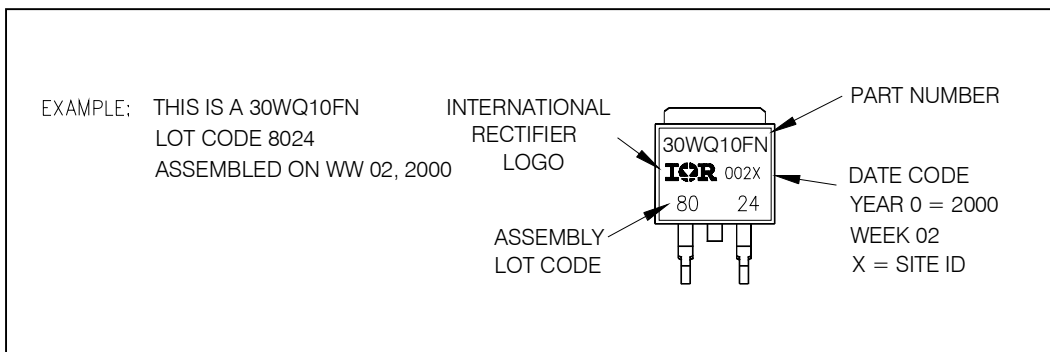
$P_d$  = Forward Power Loss =  $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);

$P_{d_{REV}}$  = Inverse Power Loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R @ V_{R1} = 80\%$  rated  $V_R$

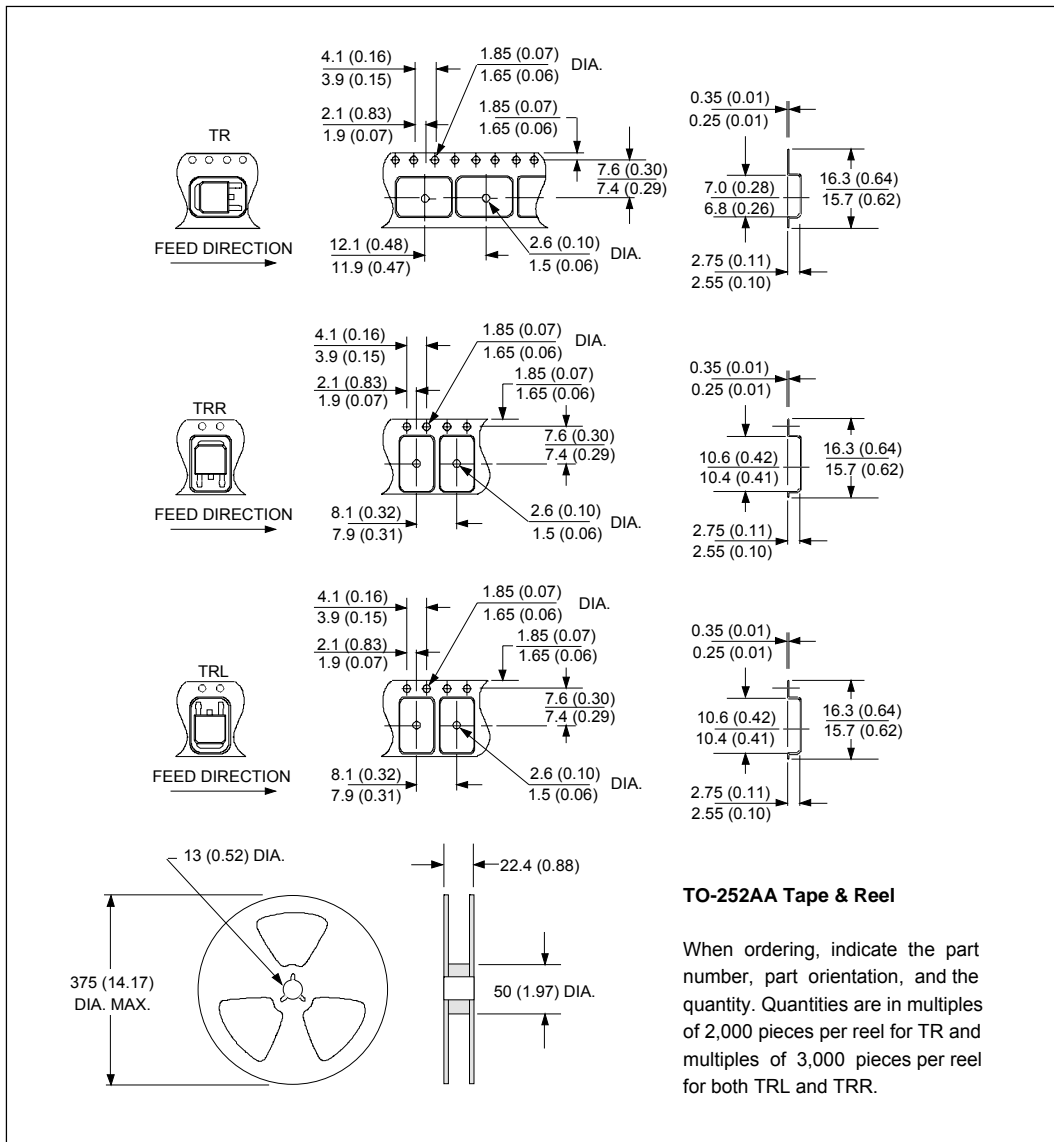
Outline Table



Part Marking Information



Tape & Reel Information



Ordering Information Table

Device Code						
30	W	Q	10	FN	TRL	-
①	②	③	④	⑤	⑥	⑦
<b>1</b>	- Current Rating (3.5A)					
<b>2</b>	- Package Identifier W = D-Pak					
<b>3</b>	- Schottky "Q" Series					
<b>4</b>	- Voltage Rating (10 = 100V)					
<b>5</b>	- FN = TO-252AA					
<b>6</b>	- • none = Tube (50 pieces) • TR = Tape & Reel • TRL = Tape & Reel (Left Oriented) • TRR = Tape & Reel (Right Oriented)					
<b>7</b>	- • none = Standard Production • PbF = Lead-Free					

Data and specifications subject to change without notice.  
 This product has been designed and qualified for AEC Q101 Level.  
 Qualification Standards can be found on IR's Web site.

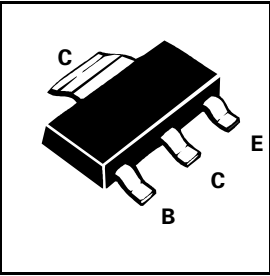
# SOT223 NPN SILICON PLANAR HIGH CURRENT (HIGH PERFORMANCE) TRANSISTORS

**FZT851**  
**FZT853**

ISSUE 2 - OCTOBER 1995

## FEATURES

- \* Extremely low equivalent on-resistance;  $R_{CE(sat)}$  **44mΩ at 5A**
- \* 6 Amps continuous current, up to 20 Amps peak current
- \* Very low saturation voltages
- \* Excellent  $h_{FE}$  characteristics specified up to 10 Amps



PARTMARKING DETAILS - DEVICE TYPE IN FULL

COMPLEMENTARY TYPES - FZT851 FZT951

FZT853 FZT953

## ABSOLUTE MAXIMUM RATINGS.

PARAMETER	SYMBOL	FZT851	FZT853	UNIT
Collector-Base Voltage	$V_{CBO}$	150	200	V
Collector-Emitter Voltage	$V_{CEO}$	60	100	V
Emitter-Base Voltage	$V_{EBO}$	6	6	V
Peak Pulse Current	$I_{CM}$	20	10	A
Continuous Collector Current	$I_C$	<b>6</b>		<b>A</b>
Power Dissipation at $T_{amb}=25^{\circ}C$	$P_{tot}$	<b>3</b>		<b>W</b>
Operating and Storage Temperature Range	$T_j; T_{stg}$	-55 to +150		$^{\circ}C$

\*The power which can be dissipated assuming the device is mounted in a typical manner on a P.C.B. with copper equal to 4 square inch minimum



# FZT851

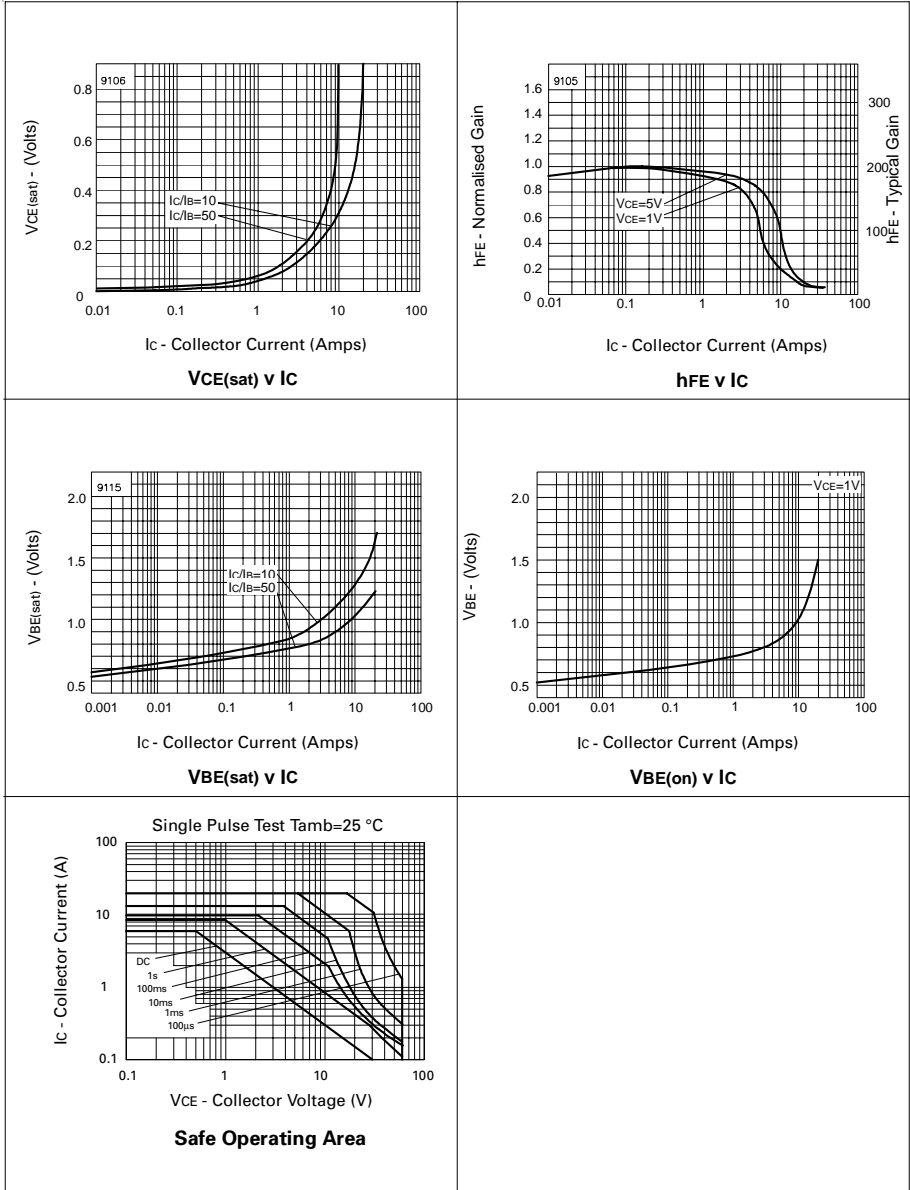
## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS.
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	150	220		V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$V_{(BR)CER}$	150	220		V	$I_C = 1\mu\text{A}$ , $R_B \leq 1\text{k}\Omega$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	60	85		V	$I_C = 10\text{mA}^*$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	6	8		V	$I_E = 100\mu\text{A}$
Collector Cut-Off Current	$I_{CBO}$			50 1	nA $\mu\text{A}$	$V_{CB} = 120\text{V}$ $V_{CB} = 120\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$
Collector Cut-Off Current	$I_{CER}$ $R \leq 1\text{k}\Omega$			50 1	nA $\mu\text{A}$	$V_{CB} = 120\text{V}$ $V_{CB} = 120\text{V}$ , $T_{amb} = 100^{\circ}\text{C}$
Emitter Cut-Off Current	$I_{EBO}$			10	nA	$V_{EB} = 6\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			50 100 170 375	mV mV mV mV	$I_C = 0.1\text{A}$ , $I_B = 5\text{mA}^*$ $I_C = 1\text{A}$ , $I_B = 50\text{mA}^*$ $I_C = 2\text{A}$ , $I_B = 50\text{mA}^*$ $I_C = 6\text{A}$ , $I_B = 300\text{mA}^*$
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			1200	mV	$I_C = 6\text{A}$ , $I_B = 300\text{mA}^*$
Base-Emitter Turn-On Voltage	$V_{BE(on)}$			1150	mV	$I_C = 6\text{A}$ , $V_{CE} = 1\text{V}^*$
Static Forward Current Transfer Ratio	$h_{FE}$	100 100 75 25	200 200 120 50	300		$I_C = 10\text{mA}$ , $V_{CE} = 1\text{V}$ $I_C = 2\text{A}$ , $V_{CE} = 1\text{V}^*$ $I_C = 5\text{A}$ , $V_{CE} = 1\text{V}^*$ $I_C = 10\text{A}$ , $V_{CE} = 1\text{V}^*$
Transition Frequency	$f_T$		130		MHz	$I_C = 100\text{mA}$ , $V_{CE} = 10\text{V}$ $f = 50\text{MHz}$
Output Capacitance	$C_{obo}$		45		pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$
Switching Times	$t_{on}$ $t_{off}$		45 1100		ns ns	$I_C = 1\text{A}$ , $I_{B1} = 100\text{mA}$ $I_{B2} = 100\text{mA}$ , $V_{CC} = 10\text{V}$

\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$   
 Spice parameter data is available upon request for this device

# FZT851

## TYPICAL CHARACTERISTICS



# Vitreous Enamelled Wirewound Resistors

## W20 Series

- CECC approved
- Suitable for harsh environments
- Impervious lead free vitreous enamel coating
- Overload characteristics ideal for protection circuits
- High stability and reliability
- High power dissipation for size



## Electrical Data

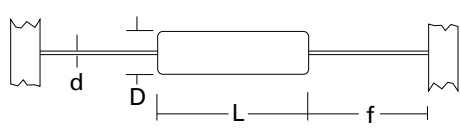
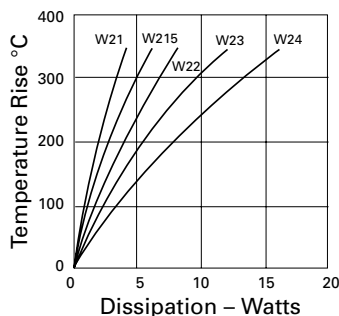
Commercial		W21	W215	W22	W23	W24
Power rating at 25°C	watts	3.0	5.0	7.0	10.0	14.0
Resistance range at	1% tolerance	1R to 10K	1R to 15K	1R to 22K	1R to 60K	1R to 100K
	2% tolerance	0R5 to 10K	0R5 to 15K	0R5 to 22K	1R to 60K	1R to 100K
	5% tolerance	0R1 to 10K	0R1 to 15K	0R1 to 22K	0R15 to 60K	0R2 to 100K
TCR (-55° to 200°C)	ppm/°C	Typically: <+75			Maximum: +200	

Approved BS CECC 40-201-002	Style	JB	HB	KB	LB	MB
Power rating at 25°C	watts	2.9	5.0	7.0	10.0	14.0
Power rating at 70°C	watts	2.5	4.3	6.0	9.0	12.0
Resistance range at	1% tolerance	1R to 10K	1R to 15K	1R to 20K	1R to 56K	1R to 100K
	2% tolerance	0R5 to 10K	0R5 to 15K	0R5 to 20K	1R to 56K	1R to 100K
	5% tolerance	0R1 to 10K	0R1 to 15K	0R1 to 20K	0R15 to 56K	0R2 to 100K
TCR (-55° to 200°C)	ppm/°C	≥5 ohms < 10 ohms: ±400			≥10 ohms: ±200	

Applicable to commercial and approved ranges						
Limiting element voltage	volts	100	160	200	500	750
Standard values		E24 preferred. Other values to special order				
Thermal impedance	°C/watt	88	58	44	29	22
Ambient temperature range	°C	-55 to 200				

## Physical Data

Dimensions (mm) and Weight (g)					
Type	L max	D max	f min	d nom	Wt.nom
W21	12.7	5.6	22.75	0.8	1
W215	22.0	7.0	23.1	0.8	2
W22	22.0	8.0	23.1	0.8	2
W23	38.0	8.0	-	0.8	3.5
W24	53.5	8.0	-	0.8	5

### Construction

A high purity ceramic substrate is assembled with interference fit end caps to which are welded the termination wires. The resistive element is wound on the substrate and welded to the caps; the vitreous enamel protective coating is then applied.

### Terminations

**Material** Copper clad steel wire, nickel plated and solder-coated.

**Strength** The terminations meet the requirements of IEC 68.2.21.

**Solderability** The terminations meet the requirements of IEC 115-1,- Clause 4.17.3.2.

**Length** W23's and W24's are not supplied on tape. Minimum lead length is 30 mm.

### Marking

The resistors are legend marked with type reference, resistance value and tolerance. Values are marked in accordance with IEC 62.

### General Note

Welwyn Components reserves the right to make changes in product specification without notice or liability. All information is subject to Welwyn's own data and is considered accurate at time of going to print.

# Vitreous Enamelled Wirewound Resistors

W20 Series

## Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

## Flammability

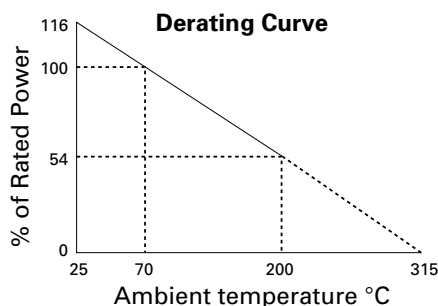
All materials used in the construction of 'W' series resistors are inorganic and inherently non burning.

## Performance Data

		CECC 40201-002	Actual Performance	
		Requirements	Maximum	Typical
Load at commercial rating: 1000 hrs at 25°C	ΔR%		5	3.5
Load at CECC rating: 1000 hours at 25°C	ΔR%	5	5	3.5
Dry heat: 1000 hours at 200°C	ΔR%	5	2	1
Shelf life: 12 months at room temperature	ΔR%	not specified	0.03	0.02
Derating		see derating curve		
Short term overload	ΔR%	1	1.0	0.2
Climatic	ΔR%	5	0.5	0.2
Climatic category	ΔR%	55/200/56		
Long term damp heat	ΔR%	5	0.05	0.02
Temperature rapid change	ΔR%	1	0.5	0.2
Resistance to solder heat	ΔR%	1	0.25	0.03
Vibration and bump	ΔR%	1	0.25	0.05
Noise (in decade of frequency)	μV/V	not specified	zero	zero
Robustness	ΔR%	1	0.4	0.05
Insulation resistance	ohms	not specified	>.1G ohm	>.1G ohm
Voltage Proof	volts	not specified	500 min	500 min
Pulse handling			data available by request	

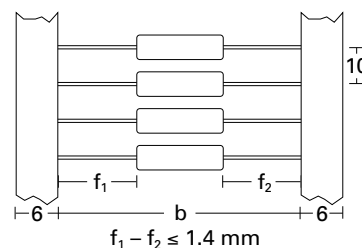
## Application Notes

The termination should not be bent closer than 1.6mm from the body, and the recommended minimum bend radius is 1.2mm. The terminations are solderable to within 4mm from the body. When cold, vitreous enamel has excellent insulation resistance. In common with all insulants the specific resistance of the enamel decreases with increase in temperature. Therefore, resistors operated at near maximum temperature cannot be classed as insulated and should not be used in contact with any conducting material. Care must be taken when determining clearance distance between the resistor body and the printed circuit board or other components to ensure these are not over heated. Resistance is measured 6mm from body.



## Packaging

For W21 and W215 the standard method of packaging is taped in Ammo Packs. For W22 the standard method of packaging is taped and reeled. Alternatives available by special request are detailed in the table below. W23's and W24's are available only as loose packed in boxes. W series resistors can be supplied preformed. Contact factory for details.



## Standard Quantities Per Package

Type	W21	W215	W22	W23	W24
Ammo pack	1000	750	500	n/a	n/a
Reel	1000	750	700	n/a	n/a
Small box	n/a	n/a	n/a	50	25

Type	b
W21	63±2
W215	73±2
W22	73±2