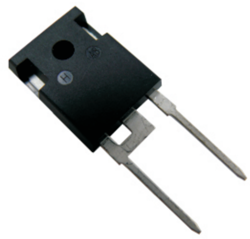
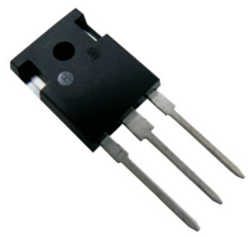
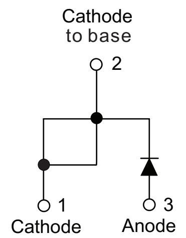
FRED
Ultrafast Soft Recovery Diode
30A / 1200V

30EPU12

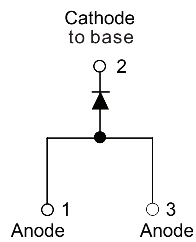


30APU12





TO-247AC modified



TO-247AB

FEATURES

- Ultrafast recovery
- 150°C operating junction temperature
- Designed and qualified for industrial level
- Compliant to RoHS
- Planar FRED Chip

BENEFITS

- Reduced RFI and EMI
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION/APPLICATIONS

These diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems.

The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for HF welding, power converters and other applications where switching losses are not significant portion of the total losses.

PRODUCT SUMMARY	
t_{rr}	36 ns
$I_{F(AV)}$	30 A
V_R	1200 V

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage	V_R		1200	V
Continuous forward current	$I_{F(AV)}$	T_C = 100 °C	30	A
Single pulse forward current	I_{FSM}	T_C = 25 °C	280	
Operating junction and storage temperatures	T_j, T_{Stg}		- 55 to 150	°C

ELECTRICAL SPECIFICATIONS (**T_J = 25 °C unless otherwise specified**)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS
Breakdown voltage	V_{BR}	I_R = 100μA	1200	-	-	V
Forward voltage	V_F	I_F = 30A	-	1.95	2.35	
		I_F = 60A	-	2.60	-	
		I_F = 30A, T_J = 125°C	-	-	2.00	
Reverse leakage current	I_R	V_R = V_R rated	-	1.0	25	μA
		T_J = 150°C, V_R = V_R rated	-	-	1000	
Junction capacitance	C_T	V_R = 200V	-	30	-	pF
Series inductance	L_S	Measure lead to lead 5mm from package body	-	10	-	nH

DYNAMIC RECOVERY CHARACTERISTICS	(T_J = 25 ºC unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time	t_{rr}	I_F = 0.5A, I_R = 1A, I_{RR}=0.25A (RG#1 CKT)		-	52	60	ns
		I_F = 1A, dI_F/dt = 200 A/µs, V_R=30V, T_J =25°C		-	36	-	
		T_J = 25°C	I_F = 30 A dI_F/dt = 200 A/µs V_R = 800 V	-	320	-	
		T_J = 125°C		-	435	-	
Peak recovery current	I_{RRM}	T_J = 25°C		-	4	-	A
		T_J = 125°C		-	9	-	
Reverse recovery charge	Q_{rr}	T_J = 25°C		-	545	-	nC
		T_J = 125°C		-	2100	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction to case	R_{thJC}		-	0.5	0.8	°C/W
Thermal resistance, junction to ambient	R_{thJA}		-	-	40	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.4	-	
Weight			-	5.5	-	g
			-	0.2	-	oz.
Mounting torque			0.6 (5)	-	1.2 (10)	N · m (lbf . in)
Marking device		Case style TO-247AC modified		30EPU12		
		Case style TO-247AB		30APU12		

Fig.1 Maximum effective transient thermal impedance, junction-to-case vs. pulse duration

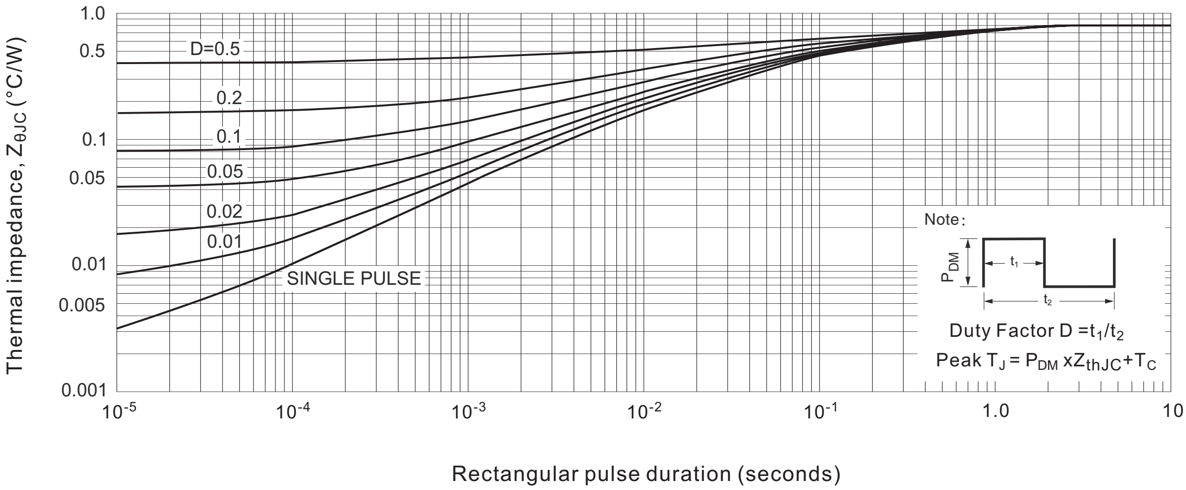


Fig.2 Forward current vs. forward voltage

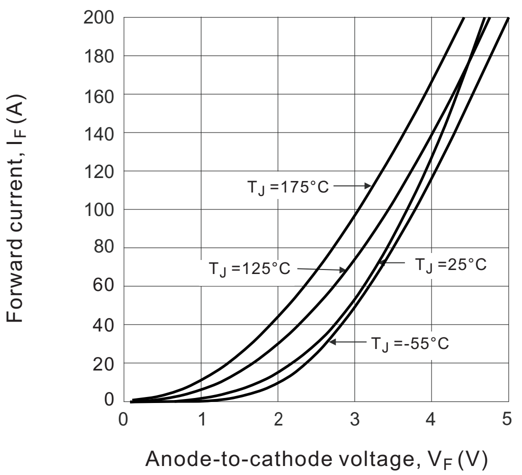


Fig.3 Reverse recovery time vs. current rate of change

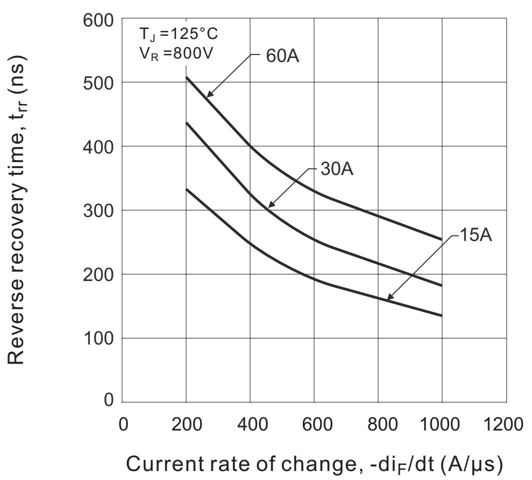


Fig.4 Reverse recovery charge vs. current rate of change

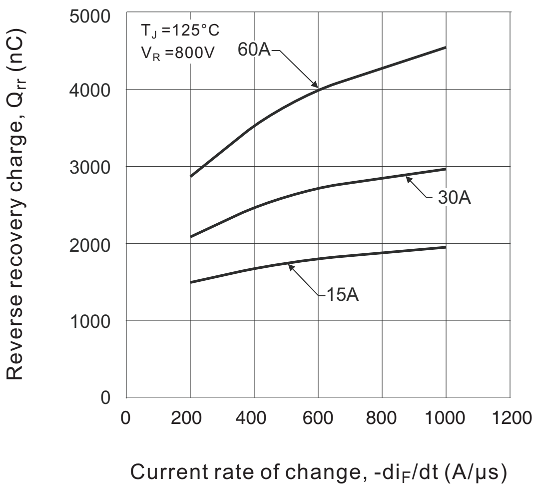


Fig 5. Reverse recovery current vs. current rate of change

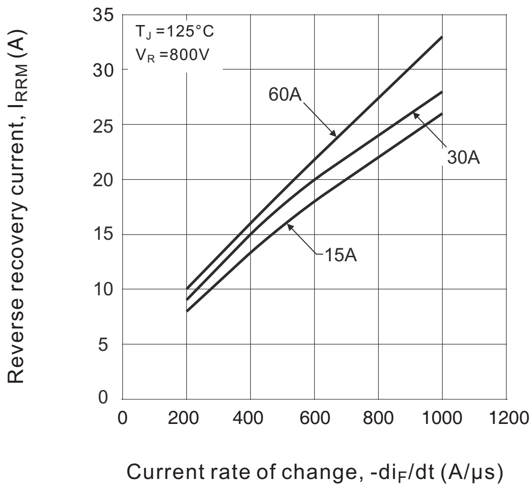


Fig6. Dynamic parameters vs. junction temperature

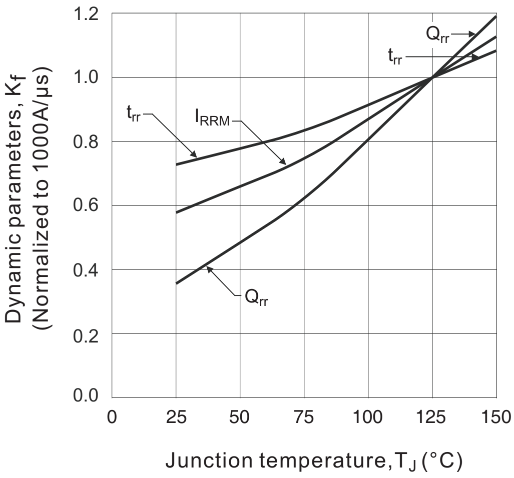


Fig.7 Maximum average forward current vs. case temperature

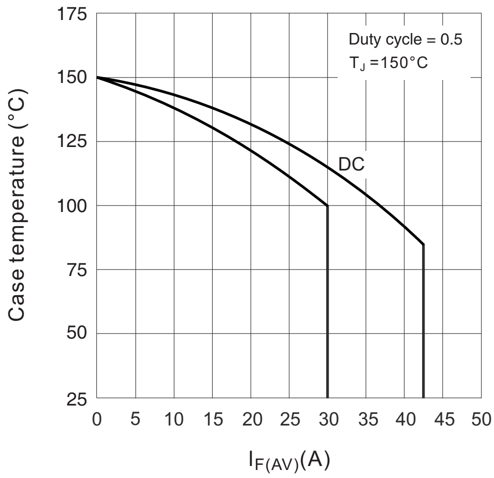
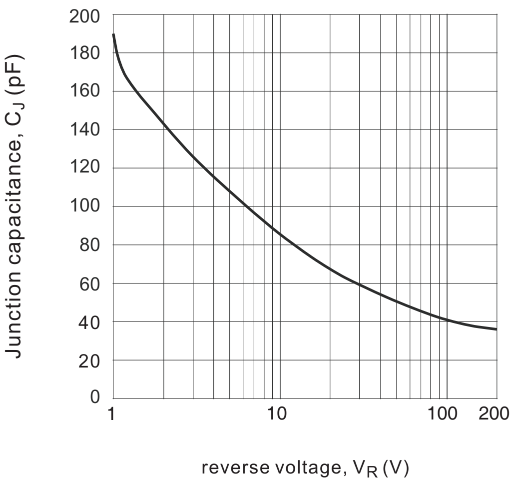


Fig.8 Junction capacitance vs. reverse voltage



Ordering Information Table

Device code

30	E	P	U	12
1	2	3	4	5

1 - Current rating (30 = 30A)

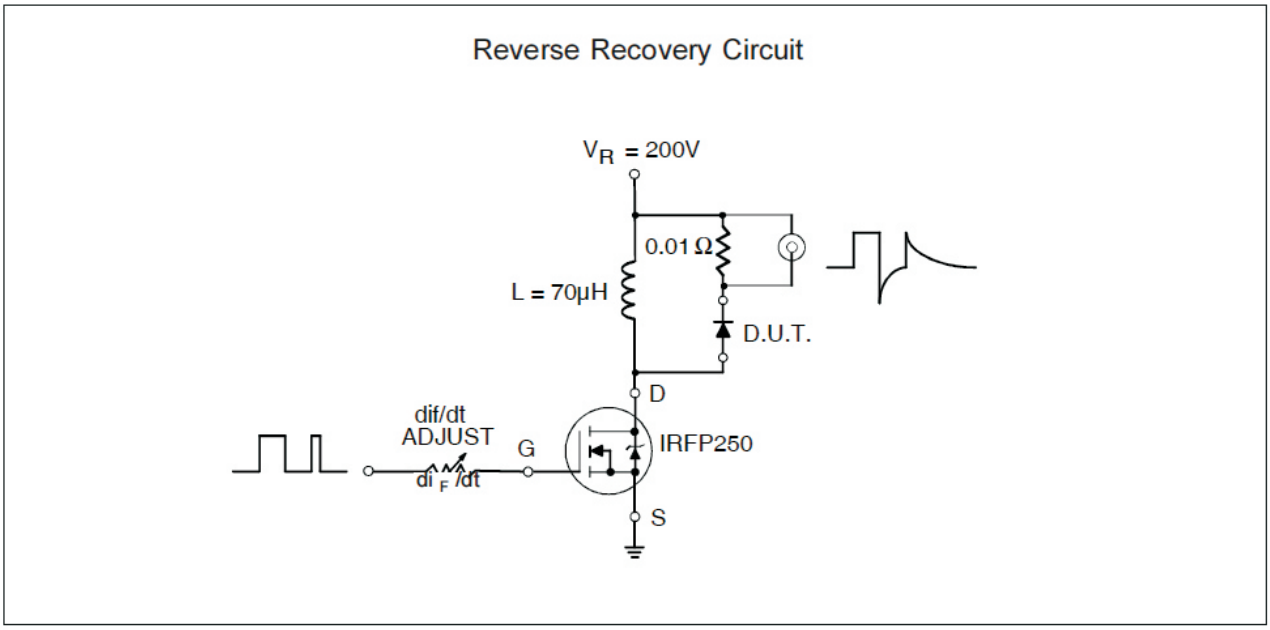
2 - Single Diode — E = 2 pins, A = 3 pins

3 - TO-247AB or TO-247AC Modified

4 - Ultrafast Recovery

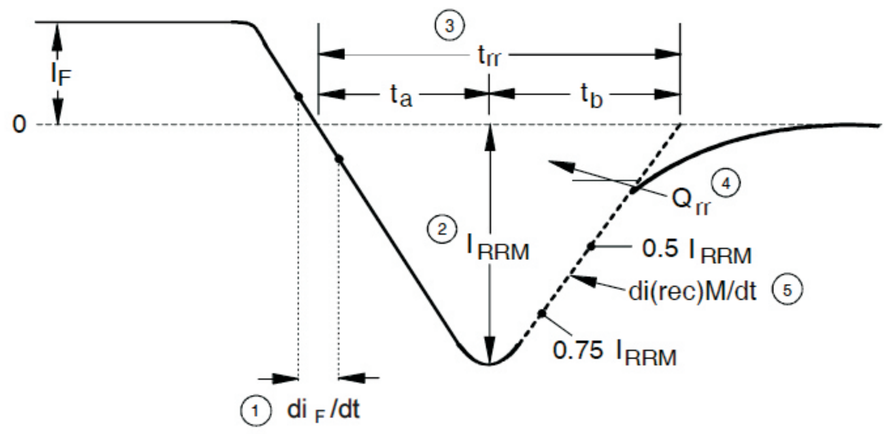
5 - Voltage Rating (12 = 1200 V)

Fig.9 Reverse recovery parameter test circuit



(3) Formula used: $T_C = T_J - (Pd + Pd_{REV}) \times R_{thJC}$;
Pd = Forward Power Loss = $I_{F(AV)} \times V_{FM}$ @ ($I_{F(AV)}$ / D) (see Fig. 6);
Pd_{REV} = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; I_R @ V_{R1} = 80% rated V_R

Fig.10 Reverse recovery waveform and definitions

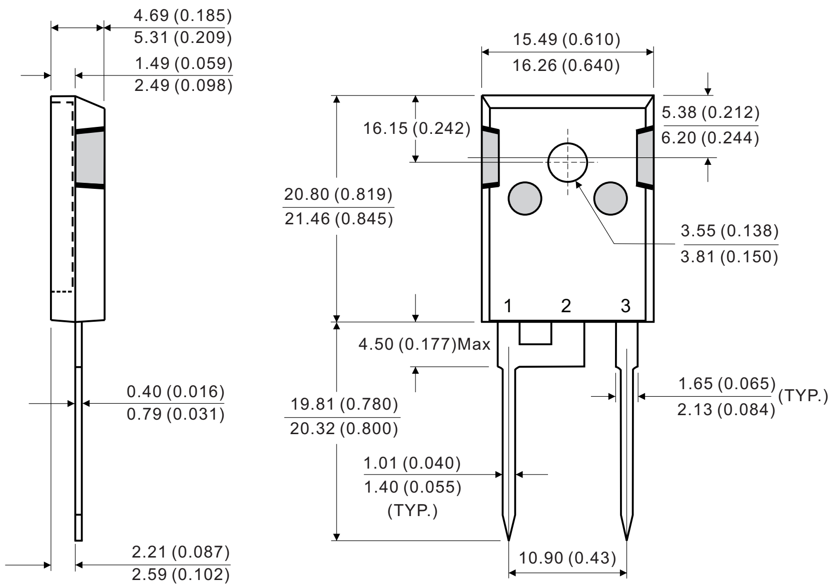


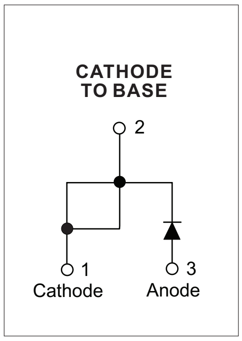
1. di_F/dt - Rate of change of current through zero crossing
2. I_{RRM} - Peak reverse recovery current
3. t_{rr} - Reverse recovery time measured from zero crossing point of negative going I_F to point where a line passing through 0.75 I_{RRM} and 0.50 I_{RRM} extrapolated to zero current
4. Q_{rr} - Area under curve defined by t_{rr} and I_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

5. $di_{(rec)M}/dt$ - Peak rate of change of current during t_b portion of t_{rr}

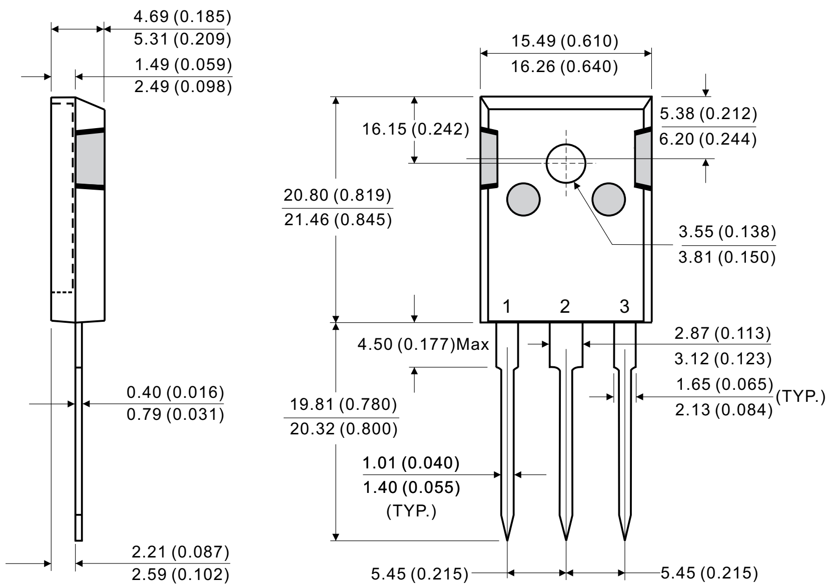
30EPU12
2 pins

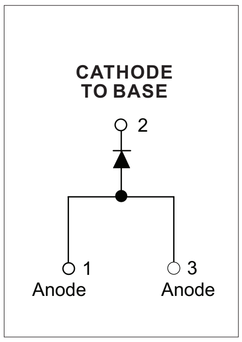




Conforms to JEDEC Outline TO-247AC (Modified)
Dimensions in millimeters and (inches)

30APU12
3 pins





Conforms to JEDEC Outline TO-247AB
Dimensions in millimeters and (inches)