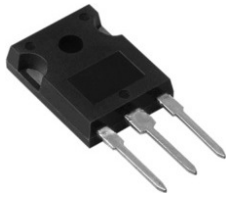
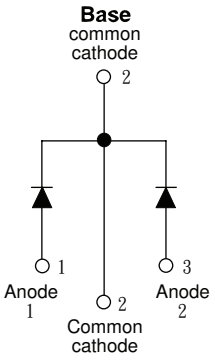
FRED
Ultrafast Soft Recovery Diode, 2 x 30 A

FEATURES

- Ultrafast recovery
- Ultrasoft recovery
- Very low I_{RRM}
- Very low Q_{rr}
- Specified at operating conditions
- Designed and qualified for industrial level



TO-247 AB



BENEFITS

- Reduced RFI and EMI
- Reduced power loss in diode and switching transistor
- Higher frequency operation
- Reduced snubbing
- Reduced parts count

DESCRIPTION

HFA60PA60C is a state of the art center tap ultrafast recovery diode. Employing the latest in epitaxial construction and advanced processing techniques it features a superb combination of characteristics which result in performance which is unsurpassed by any rectifier previously available. With basic ratings of 600V and 20 A per leg continuous current, the HFA60PA60C is especially well suited for use as the companion diode for IGBTs and MOSFETs. In addition to ultrafast recovery time, the FRED product line features extremely low values of peak recovery current (I_{RRM}) and does not exhibit any tendency to "snap-off" during the t_b portion of recovery. The FRED features combine to offer designers a rectifier with lower noise and significantly lower switching losses in both the diode and the switching transistor. These FRED advantages can help to significantly reduce snubbing, component count and heatsink sizes. The FRED HFA60PA60C is ideally suited for applications in power conversion systems (such as inverters), motor drives, and many other similar applications where high speed, high efficiency is needed.

PRODUCT SUMMARY	
V_R	600 V
V_F at 30A at 25 °C	1.4 V
$I_{F(AV)}$	2 x 30 A
t_{rr} (typical)	23 ns
T_J (maximum)	150 °C
Q_{rr} (typical)	55 nC
I_{RRM} (typical)	3.0 A

ABSOLUTE MAXIMUM RATINGS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Cathode to anode voltage		V_R		600	V
Maximum continuous forward current	per leg	I_F	T_C = 100 °C	30	A
	per device			60	
Single pulse forward current		I_{FSM}		320	
Operating junction and storage temperature range		T_J, T_{Stg}		- 55 to + 150	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 ºC unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Cathode to anode breakdown voltage	V_{BR}	I_R = 100 µA	600	-	-	V
Maximum forward voltage	V_{FM}	I_F = 30 A	-	1.4	1.8	
		I_F = 60 A	-	1.7	2.0	
		I_F = 30 A, T_J = 125 ºC	-	1.1	1.5	
Maximum reverse leakage current	I_{RM}	V_R = V_R rated	-	-	100	µA
		T_J = 125°C, V_R = V_R rated	-	-	500	
Junction capacitance	C_T	V_R = 150V	-	36	-	pF

DYNAMIC RECOVERY CHARACTERISTICS PERLEG (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 = 1.0A, I_{RR} = 250mA (RG#1 CKT)		-	30	35	ns
		I_F = 1.0 A, dI_F/dt = -100 A/µs, V_R =30 V, T_J = 25°C		-	23	-	
	t_{rr1}	T_J = 25 ºC	I_F= 30A dI_F/dt = -200 A/µs V_R = 400 V	-	30	50	
	t_{rr2}	T_J = 125 ºC		-	95	-	
Peak recovery current	I_{RRM1}	T_J = 25 ºC		-	3	-	A
	I_{RRM2}	T_J = 125 ºC		-	6	-	
Reverse recovery charge	Q_{rr1}	T_J = 25 ºC		-	55	-	nC
	Q_{rr2}	T_J = 125 ºC		-	485	-	

THERMAL - MECHANICAL SPECIFICATIONS PER LEG						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Lead temperature	T_{lead}	0.063" from case (1.6 mm) for 10 s	-	-	300	°C
Junction to case, single leg conduction	R_{thJC}		-	-	0.8	K/W
Junction to case, both legs conducting			-	-	0.4	
Thermal resistance, junction to ambient	R_{thJA}	Typical socket mount	-	-	60	
Thermal resistance, case to heatsink	R_{thCS}	Mounting surface, flat, smooth and greased	-	0.4	-	
Weight			-	6.0	-	g
			-	0.21	-	oz.
Mounting torque			6.0 (5.0)	-	12 (10)	kgf . cm (lbf . in)
Marking device		Case style TO-247AB (JEDEC)	HFA60PA60C			

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

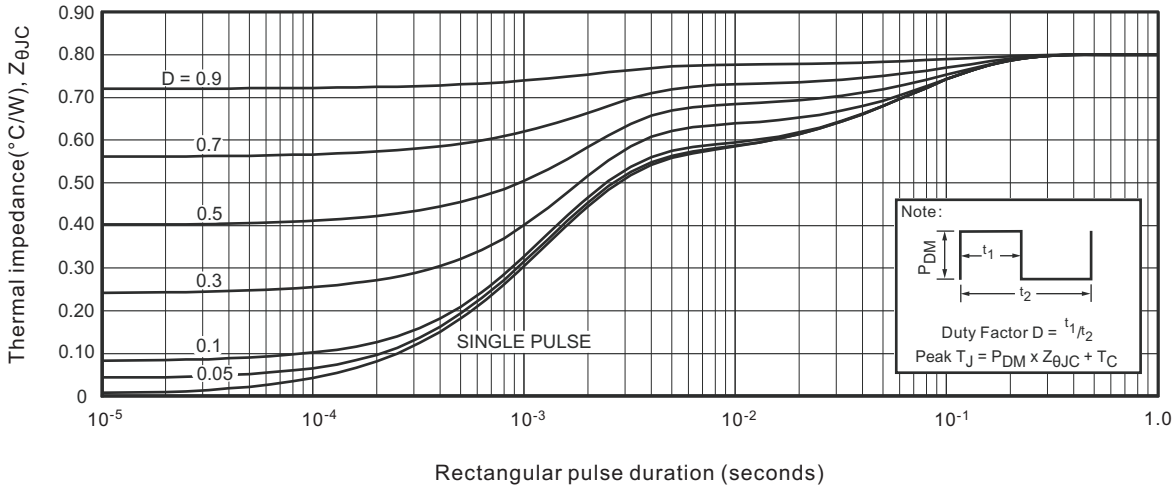


Fig.2 Forward current vs. forward voltage

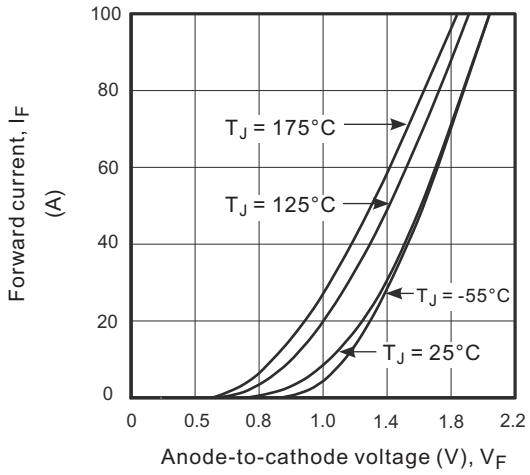


Fig.3 Reverse recovery time vs. current rate of change

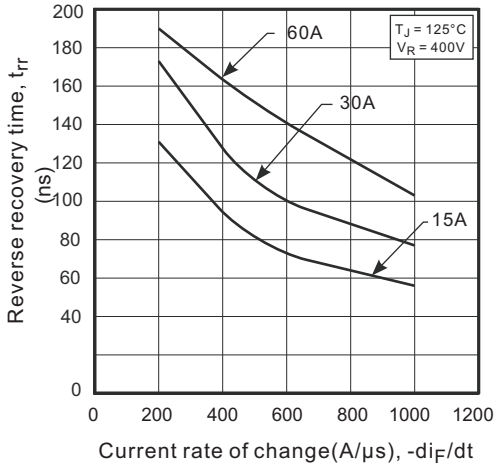


Fig.4 Reverse recovery charge vs. current rate of change

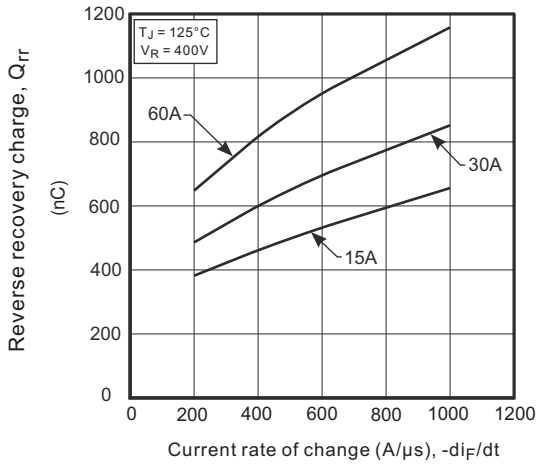


Fig 5. Reverse recovery current vs. current rate of change

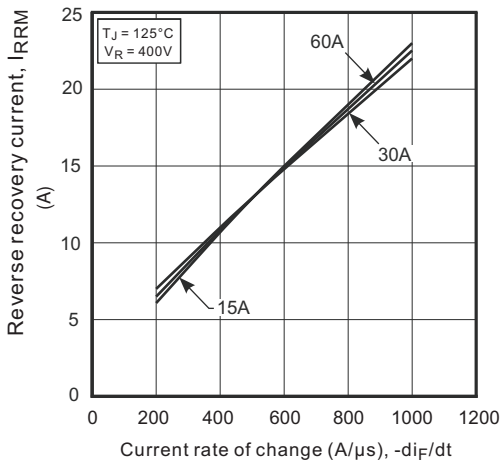


Fig6. Dynamic parameters vs. junction temperature

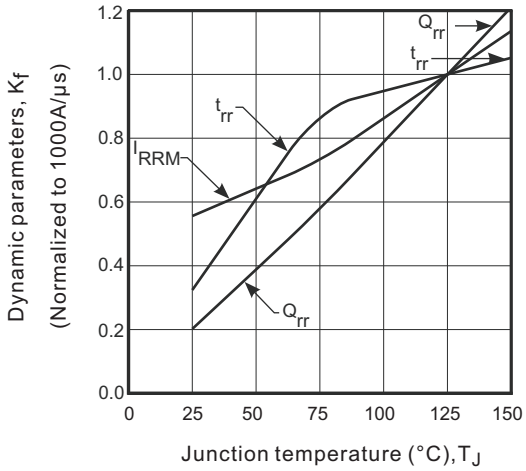


Fig.7 Maximum average forward current vs. case temperature

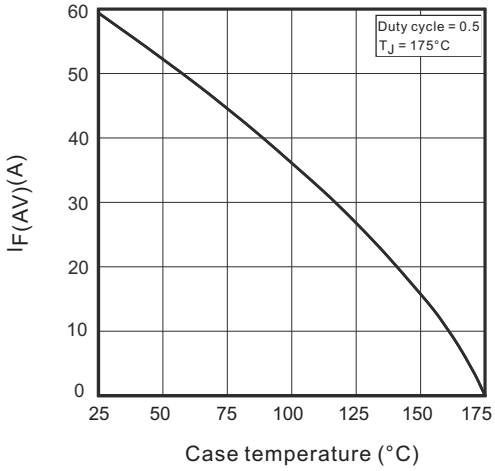
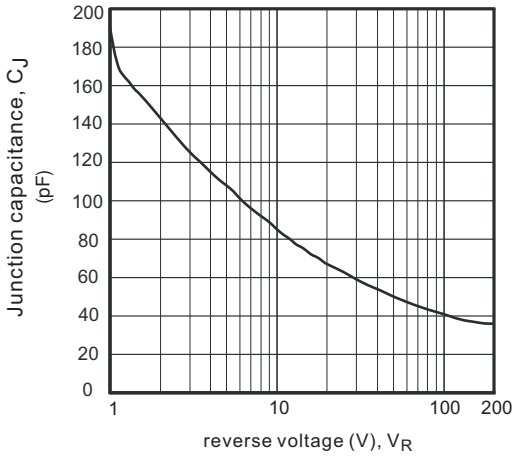


Fig.8 Junction capacitance vs. reverse voltage

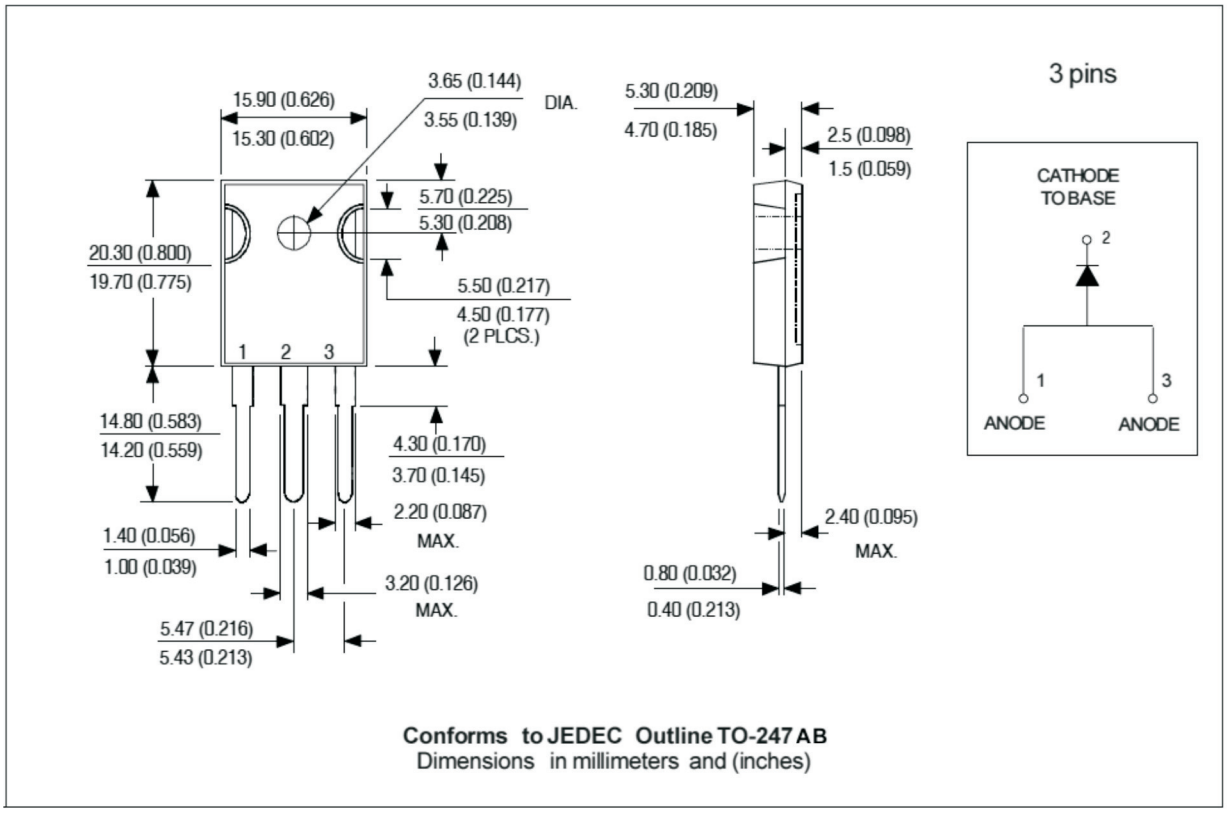


ORDERING INFORMATION TABLE

Device code

N	–	HFA	60	PA	60	C
①		②	③	④	⑤	⑥

1 - Nell Semiconductors product
2 - FRED family
3 - Current rating (60 =30 A, 30A x 2)
4 - Package outline (PA = TO-247, 3 pins)
5 - Voltage rating (60 = 600 V)
6 - Configuration (C = Center tap common cathode)



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