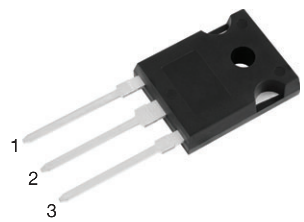
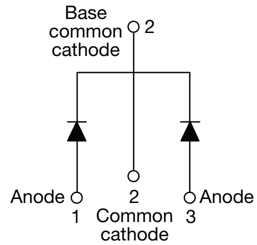
Hyperfast Rectifier, 2 x 30 A FRED Pt® G5



TO-247AD 3L



LINKS TO ADDITIONAL RESOURCES

3D Models

Application Notes

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$ per leg	30 A
V_R	600 V
V_F at I_F at 125 °C	1.6 V
t_{rr} (typ.)	20
I_{FSM}	280
T_J max.	175 °C
Package	TO-247AD 3L
Circuit configuration	Common cathode

FEATURES

- Hyperfast and optimized Q_{rr}
- Best in class forward voltage drop and switching losses trade off
- Optimized for high speed operation
- 175 °C maximum operating junction temperature
- Polyimide passivation
- AEC-Q101 qualified meets JESD 201 class tin whisker 2 test
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free
RoHS
COMPLIANT
HALOGEN
FREE

DESCRIPTION / APPLICATIONS

Featuring a unique combination of low conduction and switching losses, this rectifier is the right choice for soft switched and resonant converters, as well as medium frequency hard switching converters. This device is specifically designed to improve efficiency of high speed LLC output rectification stages of EV / HEV on-board battery chargers

MECHANICAL DATA

Case: TO-247AD 3L

Molding compound meets UL 94 V-0 flammability rating

Terminal: matte tin plated leads, solderable per J-STD-002

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**VALUES**	**UNITS**
Repetitive peak reverse voltage	V_{RRM}		600	V
Average rectified forward current per leg	$I_{F(AV)}$	T_C = 107 °C, D = 0.50	30	A
Non-repetitive peak surge current per leg	I_{FSM}	T_C = 25 °C, t_p = 10 ms, sine wave	280	
Repetitive peak forward current per leg	I_{FRM}	T_C = 107 °C, D = 0.50, f = 20 kHz	60	
Operating junction and storage temperature	T_J, T_{Stg}		-55 to +175	°C

ELECTRICAL SPECIFICATIONS (T_J = 25 °C unless otherwise specified)						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Breakdown voltage, blocking voltage per leg	V_{BR},V_R	I_R = 100 μA	600	-	-	V
Forward voltage per leg	V_F	I_F = 30 A	-	2.1	2.5	
		I_F = 30 A, T_J = 125 °C	-	1.6	-	
Reverse leakage current per leg	I_R	V_R = V_R rated	-	-	20	μA
		T_J = 125 °C, V_R = V_R rated	-	-	500	
Junction capacitance per leg	C_T	V_R = 200 V	-	36	-	pF
Series inductance per leg	L_S	Measured to lead 5 mm from package body	-	8	-	nH

DYNAMIC RECOVERY CHARACTERISTICS (T_J = 25 °C unless otherwise specified)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNITS**
Reverse recovery time per leg	t_{rr}	I_F = 1.0 A, dI_F/dt = 100 A/μs, V_R = 30 V		-	20	-	ns
		T_J = 25 °C	I_F = 20 A dI_F/dt = 1000 A/μs V_R = 400 V	-	20	-	
		T_J = 125 °C		-	46	-	
Peak recovery current per leg	I_{RRM}	T_J = 25 °C		-	10	-	A
		T_J = 125 °C		-	18	-	
Reverse recovery charge per leg	Q_{rr}	T_J = 25 °C		-	115	-	nC
		T_J = 125 °C		-	560	-	
Reverse recovery time per leg	t_{rr}	T_J = 25 °C	I_F = 30 A dI_F/dt = 1000 A/μs V_R = 400 V	-	39	-	ns
		T_J = 125 °C		-	49	-	
Peak recovery current per leg	I_{RRM}	T_J = 25 °C		-	10.5	-	A
		T_J = 125 °C		-	20.5	-	
Reverse recovery charge per leg	Q_{rr}	T_J = 25 °C		-	185	-	nC
		T_J = 125 °C		-	650	-	

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER	**SYMBOL**	**TEST CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNITS**
Thermal resistance, junction-to-case per leg	R_{thJC}		-	-	1.1	°C/W
Weight			-	5.5	-	g
Mounting torque			6 (5)	-	12 (10)	kgf · cm (lbf · in)
Maximum junction and storage temperature range	T_J, T_{Stg}		-55	-	175	°C
Marking device		Case style: TO-247AD 3L	C5PW6006LH			

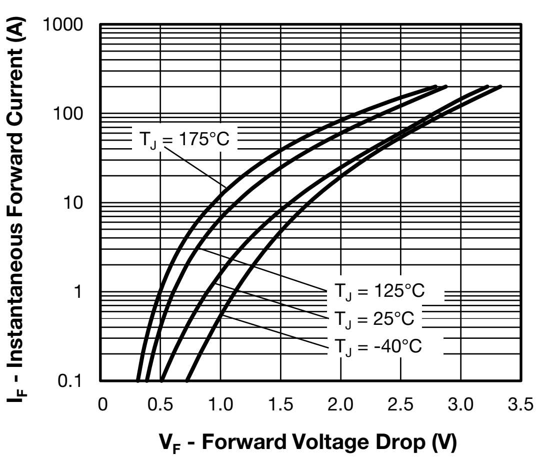


Fig. 1 - Typical Forward Voltage Drop Characteristics Per Leg

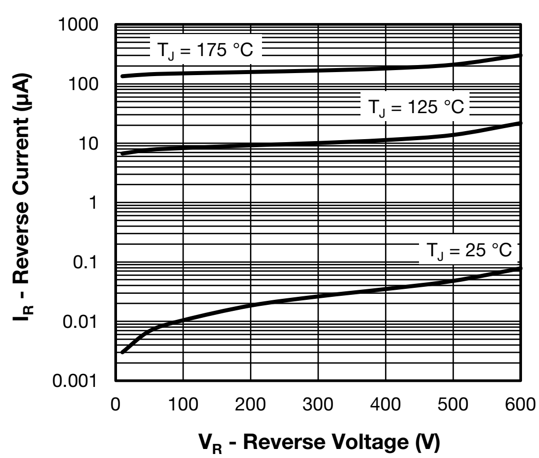


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage Per Leg

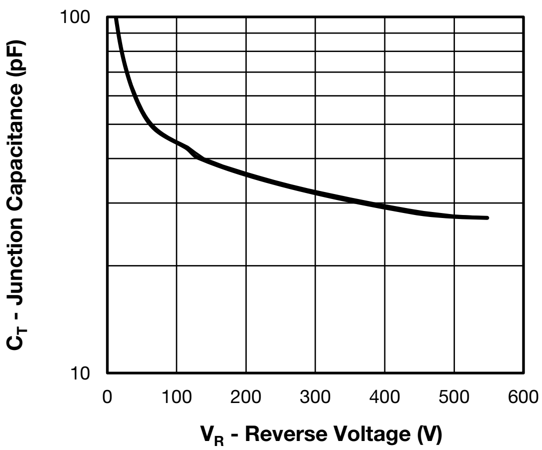


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage Per Leg

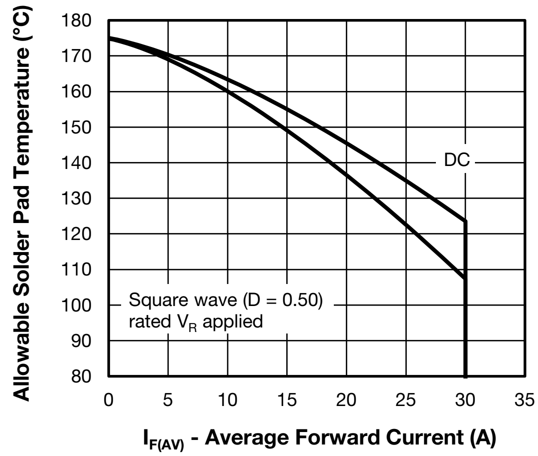


Fig. 4 - Maximum Allowable Case Temperature vs. Average Forward Current Per Leg

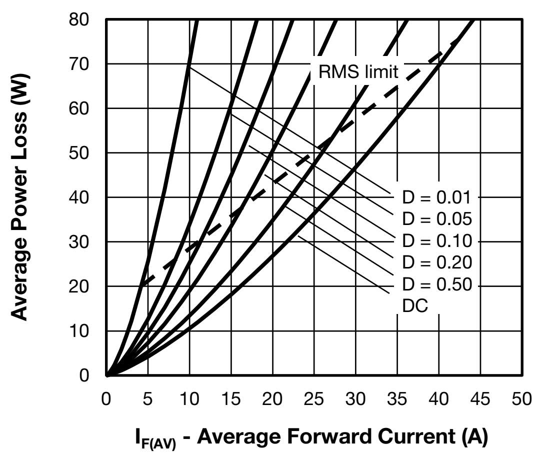


Fig. 5 - Average Power Loss vs. Average Forward Current Per Leg

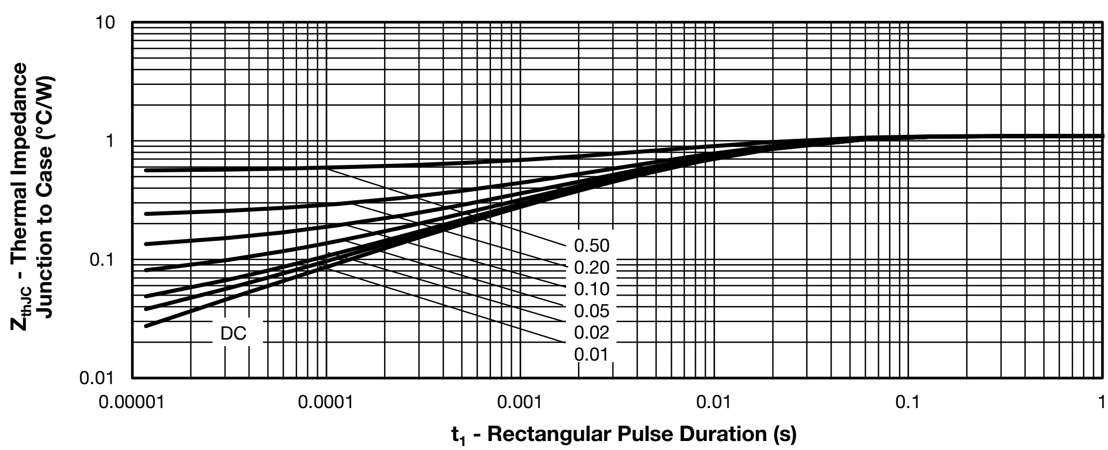


Fig. 6 - Thermal Impedance Z_{thJC} - Characteristics Per Leg

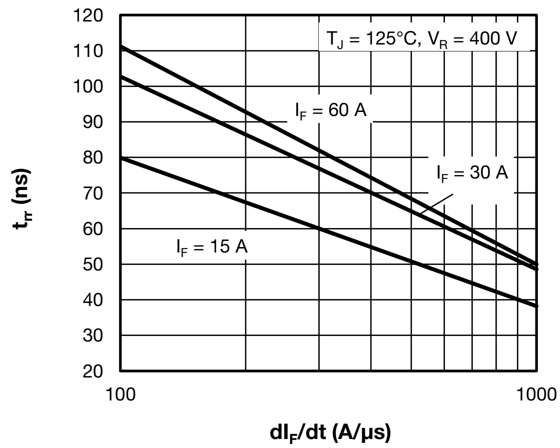


Fig. 7 - Typical Reverse Recovery Time vs. dI_F/dt Per Leg

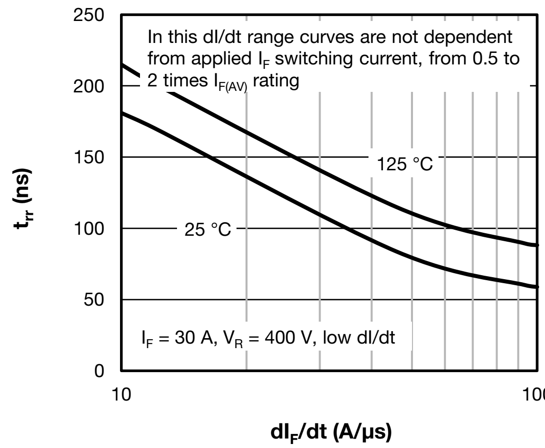


Fig. 10 - Typical Reverse Recovery Time vs. dI_F/dt Per Leg

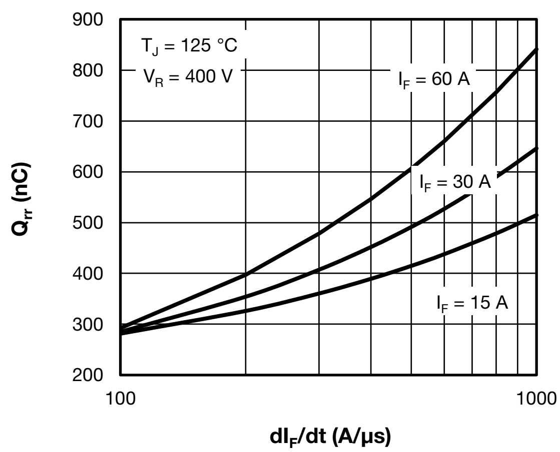


Fig. 8 - Typical Reverse Recovery Charge vs. dI_F/dt Per Leg

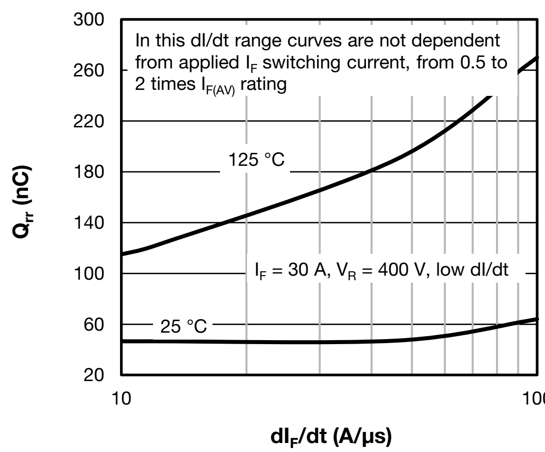


Fig. 11 - Typical Reverse Recovery Charge vs. dI_F/dt Per Leg

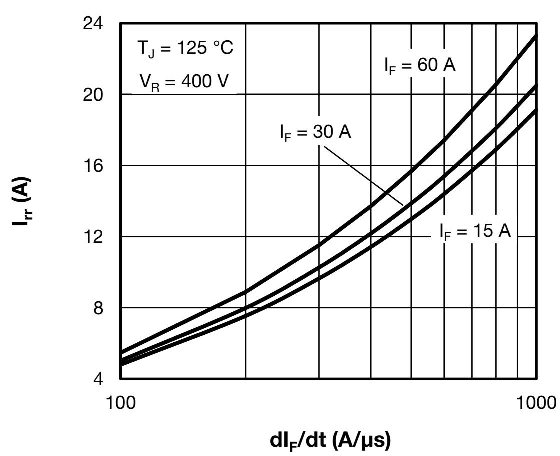


Fig. 9 - Typical Reverse Recovery Current vs. dI_F/dt Per Leg

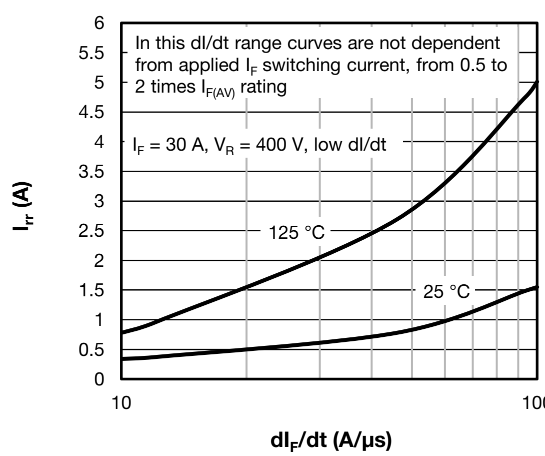


Fig. 12 - Typical Reverse Recovery Current vs. dI_F/dt Per Leg

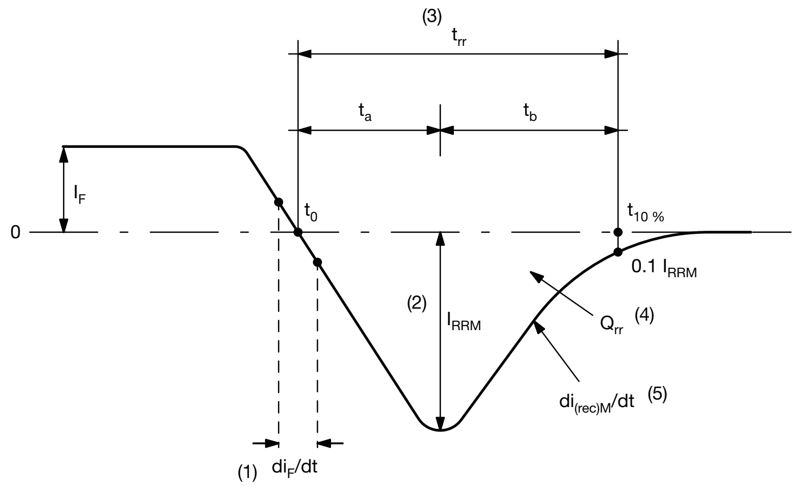


Fig. 13 - Reverse Recovery Waveform and Definitions

Notes

(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 t_0, crossing point of negative going I_F, to point $t_{10\%}$, 0.1 I_{RRM}
(4) Q_{rr} - area under curve defined by t_0 and $t_{10\,\%}$

$$Q_{rr} = \int_{t_0}^{t_{10\,\%}} I(t)dt$$

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

ORDERING INFORMATION TABLE

Device code

VS-	C	5	P	W	60	06	L	H	N3
1	2	3	4	5	6	7	8	9	10

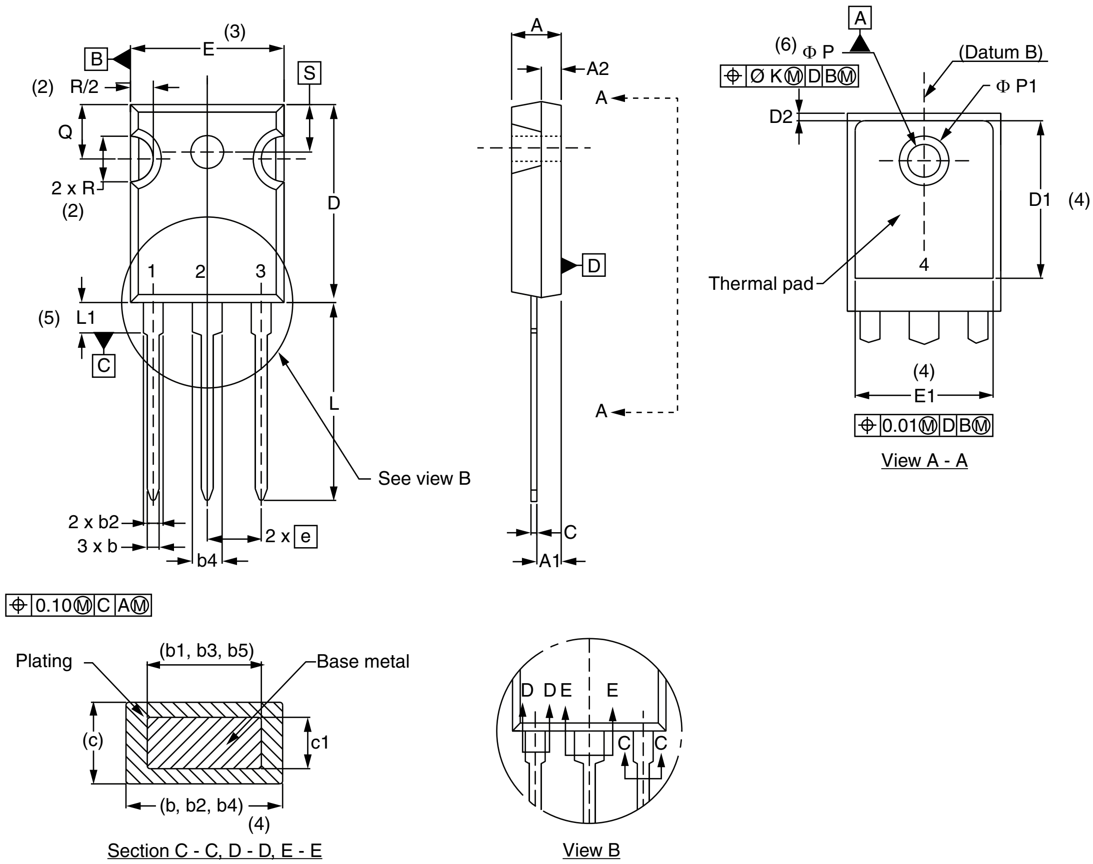
1 - Vishay Semiconductors product
2 - Circuit configuration
C = common cathode
3 - FRED Pt® Gen 5
4 - P = TO-247 package
5 - Process type:
W = warp hyperfast recovery
6 - Current rating (60 = 60 A)
7 - Voltage rating (06 = 600 V)
8 - Package: L = long lead (TO-247AD)
9 - H = AEC-Q101 qualified
10 - Environmental digit:
N3 = halogen-free, RoHS-compliant, and totally lead (Pb)-free

ORDERING INFORMATION (Example)			
PREFERRED P/N	**QUANTITY PER TUBE**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-C5PW6006LHN3	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95626
Part marking information	www.vishay.com/doc?95007

TO-247AD 3L

DIMENSIONS in millimeters and inches



SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.			MIN.	MAX.	MIN.	MAX.	
A	4.65	5.31	0.183	0.209		D2	0.51	1.30	0.020	0.051	
A1	2.21	2.59	0.087	0.102		E	15.29	15.87	0.602	0.625	3
A2	1.50	2.49	0.059	0.098		E1	13.46	-	0.53	-	
b	0.99	1.40	0.039	0.055		e	5.46 BSC		0.215 BSC		
b1	0.99	1.35	0.039	0.053		Ø K	0.254		0.010		
b2	1.65	2.39	0.065	0.094		L	19.81	20.32	0.780	0.800	
b3	1.65	2.34	0.065	0.092		L1	3.71	4.29	0.146	0.169	
b4	2.59	3.43	0.102	0.135		Ø P	3.56	3.66	0.14	0.144	
b5	2.59	3.38	0.102	0.133		Ø P1	-	6.98	-	0.275	
c	0.38	0.89	0.015	0.035		Q	5.31	5.69	0.209	0.224	
c1	0.38	0.84	0.015	0.033		R	4.52	5.49	0.178	0.216	
D	19.71	20.70	0.776	0.815	3	S	5.51 BSC		0.217 BSC		
D1	13.08	-	0.515	-	4						

Notes

(1) Dimensioning and tolerancing per ASME Y14.5M-1994
(2) Contour of slot optional
(3) Dimension D and E do not include mold flash. These dimensions are measured at the outermost extremes of the plastic body
(4) Thermal pad contour optional with dimensions D1 and E1
(5) Lead finish uncontrolled in L1
(6) Ø P to have a maximum draft angle of 1.5 to the top of the part with a maximum hole diameter of 3.91 mm (0.154")
(7) Outline conforms to JEDEC® outline TO-247 with exception of dimension A min., D, E min., Q min., S, and note 4

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