VFPB010R046NA

Datasheet

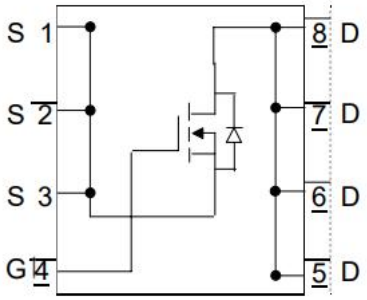
4.6mΩ, 100V, N-Channel Power MOSFET VFPB010R046NA

Description

$V_{(BR)DSS}$	$R_{DS(ON)\_max}$	I_D
100V	4.6mΩ@10V	85A

- 100V N-channel SGT MOSFET
- It has been designed to very low on-state resistance (R_{DSON}) and yet maintain superior switching performance

Symbol

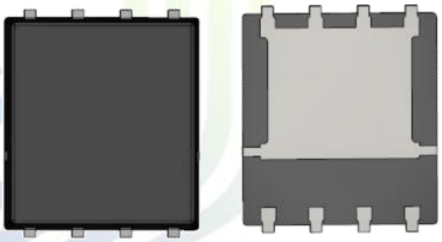


Symbol of VFPB010R046NA

Features

- N-channel,optimized for high-speed smooth switching
- Excellent Gate charge× R_{DSON}(FOM)
- Very low on-resistance
- RoHS compliant[Note 1]
- Halogen-free[Note1]

Package Type



Package Type of VFPB010R046NA

Application

- Motor Drivers
- DC-DC Converter
- Power Management

Ordering Information

Product Name	Package
VFPB010R046NA	PDFN5×6

Absolute Maximum Ratings (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Value	Units
Drain-Source Voltage	V_{DS}	100	V
Drain Current - Continuous (T_C= 25°C)	I_D	85	A
Drain Current - Continuous (T_C= 100°C)		53	A
Drain Current – Pulsed Note 1,2	I_{DM}	260	A
Gate-Source Voltage	V_{GS}	± 20	V
Single Pulsed Avalanche Energy Note 3	E_{AS}	256	mJ
Power Dissipation (T_C = 25°C)	P_D	56.8	W
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to +150	°C

Thermal Resistance

Parameter	Symbol	Value	Units
Thermal Resistance, Junction-to-Case, Steady-State	$R_{\theta JC}$	2.2	°C/W
Thermal Resistance, Junction-to-Ambient, Steady State Note 4	$R_{\theta JA}$	50	°C/W

Notes:

1. The max drain current rating is package limited.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 0.5 mH, V_{DD} = 50 V, I_{AS} = 32 A, R_g = 25Ω, Starting T_J= 25°C.
4. Mount on minimum PCB layout.

Electrical Characteristics (T_J= 25 ºC, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V, V_{GS}=0V	-	-	1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ± 20 V, V_{DS} = 0 V	-	-	±100	nA
Gate Threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.4	1.9	2.4	V
Drain-Source on-state resistance	$R_{DS(ON)}$	V_{GS} = 10 V, I_D = 30 A	-	3.8	4.6	mΩ
		V_{GS} = 4.5 V, I_D = 20 A	-	5.2	6.4	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V f = 1 MHz	-	4590	-	pF
Output Capacitance	C_{oss}		-	1060	-	pF
Reverse Transfer Capacitance	C_{rss}		-	38.4	-	pF
Gate Resistance	R_g	f = 1 MHz	-	2.5	-	Ω
Switching Characteristics						
Turn On Delay Time	$T_{D(on)}$	V_{DS} = 50V , I_D = 80A V_{GS} = 10V, R_G = 6 Ω	-	20.4	-	ns
Rise Time	t_r		-	31	-	ns
Turn Off Delay Time	$t_{D(off)}$		-	76.8	-	ns
Fall Time	T_f		-	36.2	-	ns
Total Gate Charge	Q_g	V_{DS} = 50 V , I_D = 40 A V_{GS} = 10 V	-	79	-	nC
Gate-Source Charge	Q_{gs}		-	16	-	nC
Gate-Drain Charge	Q_{gd}		-	16.4	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
Maximum Continuous Body-Diode Forward Current	I_S		-	85	-	A
Maximum Pulsed Body-Diode Forward Current Note1	I_{SM}		-	260	-	A
Diode Forward Voltage	V_{SD}	V_{GS} = 0 V,I_S= 40 A	-	0.85	-	V
Reverse recovery time	t_{rr}	I_F = 80 A di/dt = 100 A/μS	-	43.4	-	ns
Reverse recovery charge	Q_{rr}		-	52.7	-	nC

Electrical Characteristics Diagrams

Figure 1: On-Region Characteristics

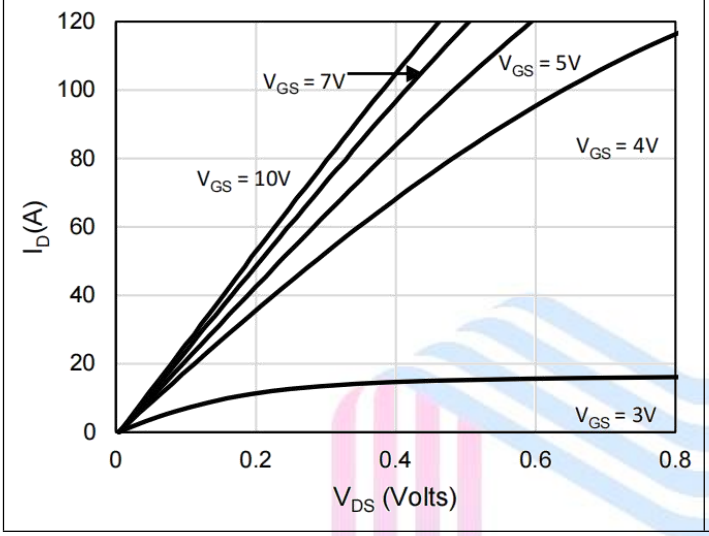


Figure 2: Transfer Characteristics

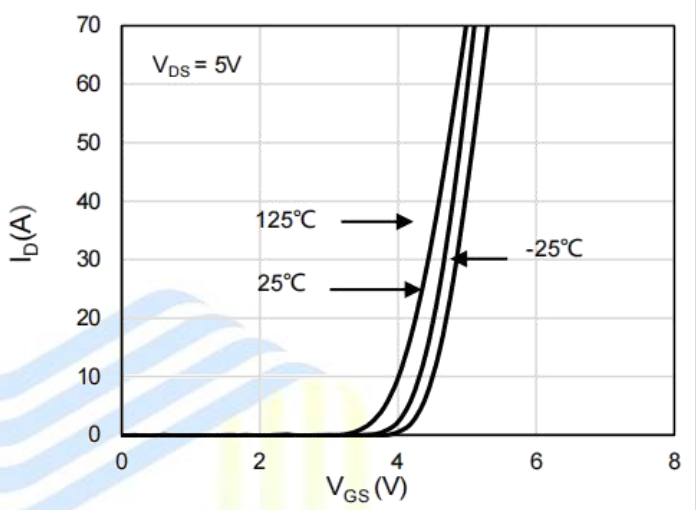


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

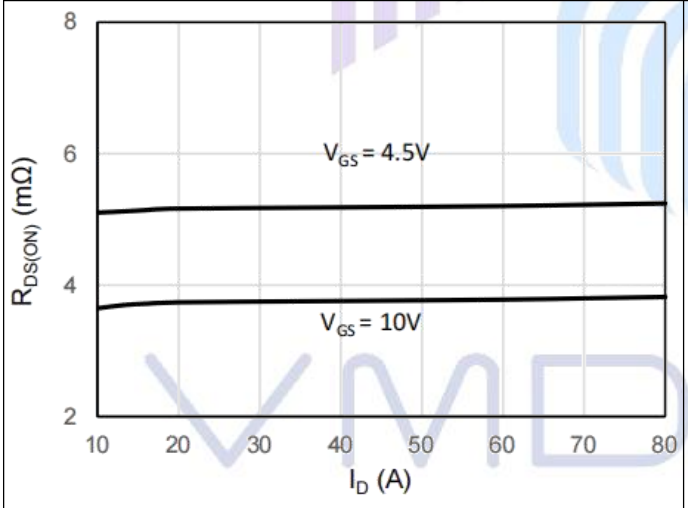


Figure 4:On-Resistance vs. Junction Temperature

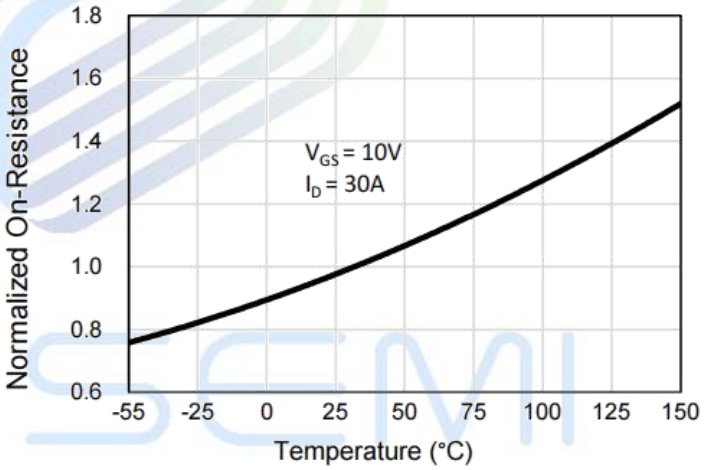


Figure 5: On-Resistance vs. Gate-Source Voltage

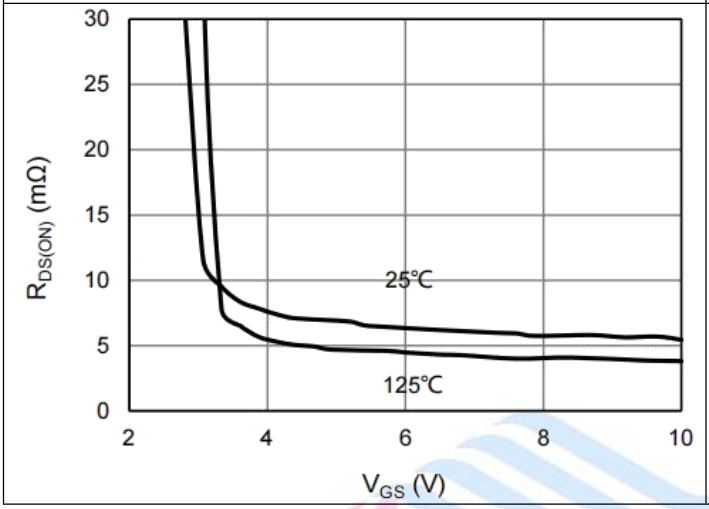


Figure 6: Body-Diode Characteristics

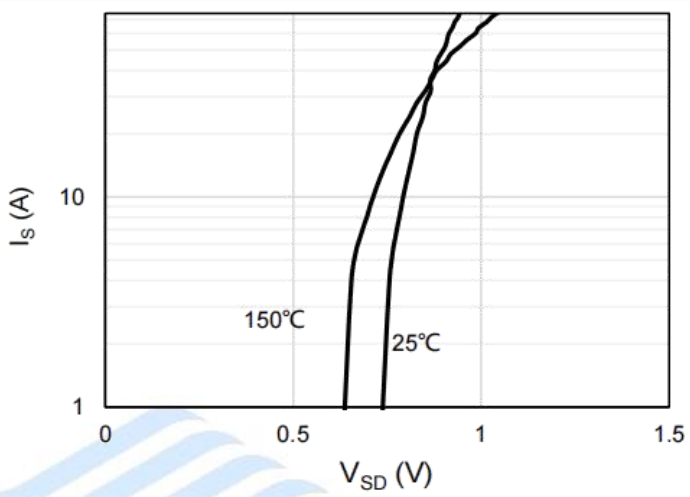


Figure 7: Gate-Charge Characteristics

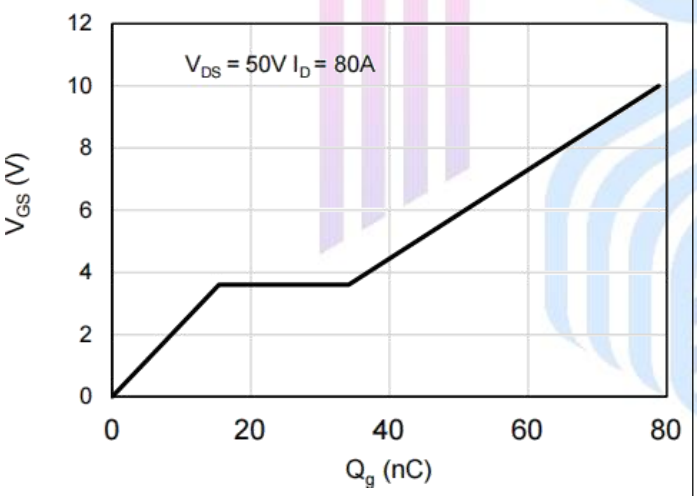


Figure 8: Capacitance Characteristics

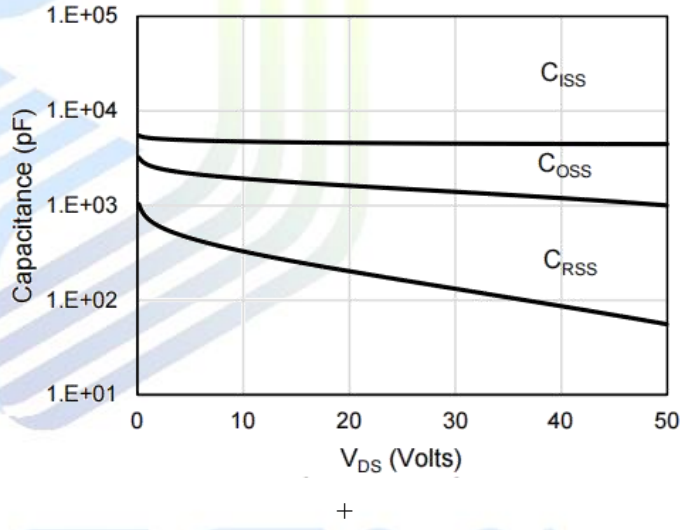


Figure 9: Maximum Forward Biased Safe Operating Area

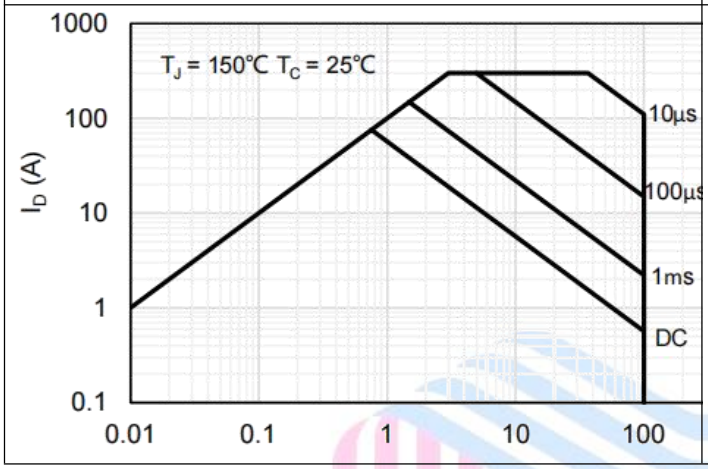


Figure 10: Single Pulse Power Rating Junction-to-Case

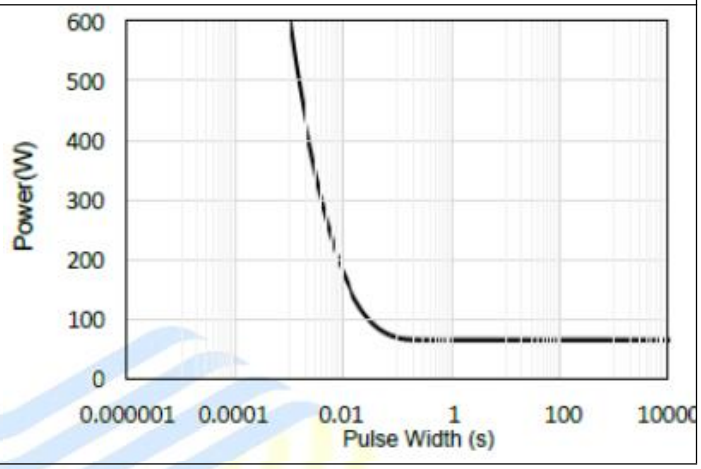


Figure 11: Current De-rating

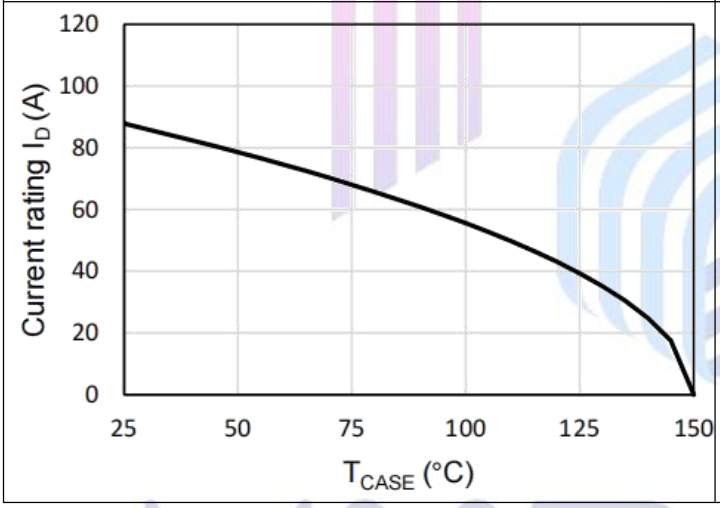


Figure 12: Power De-rating

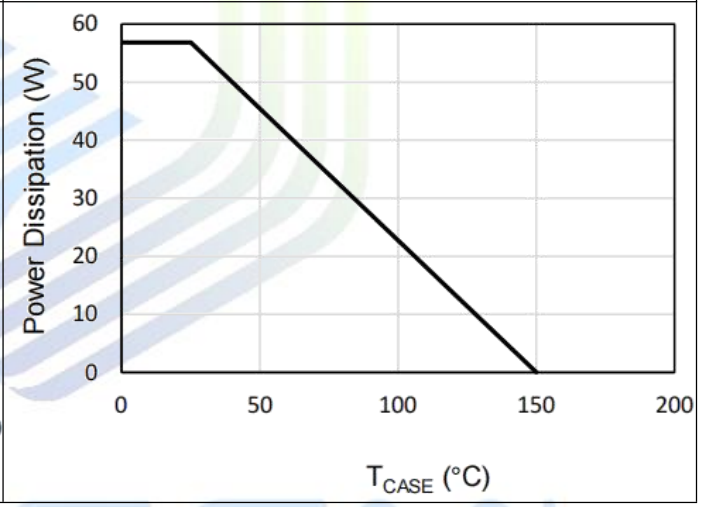
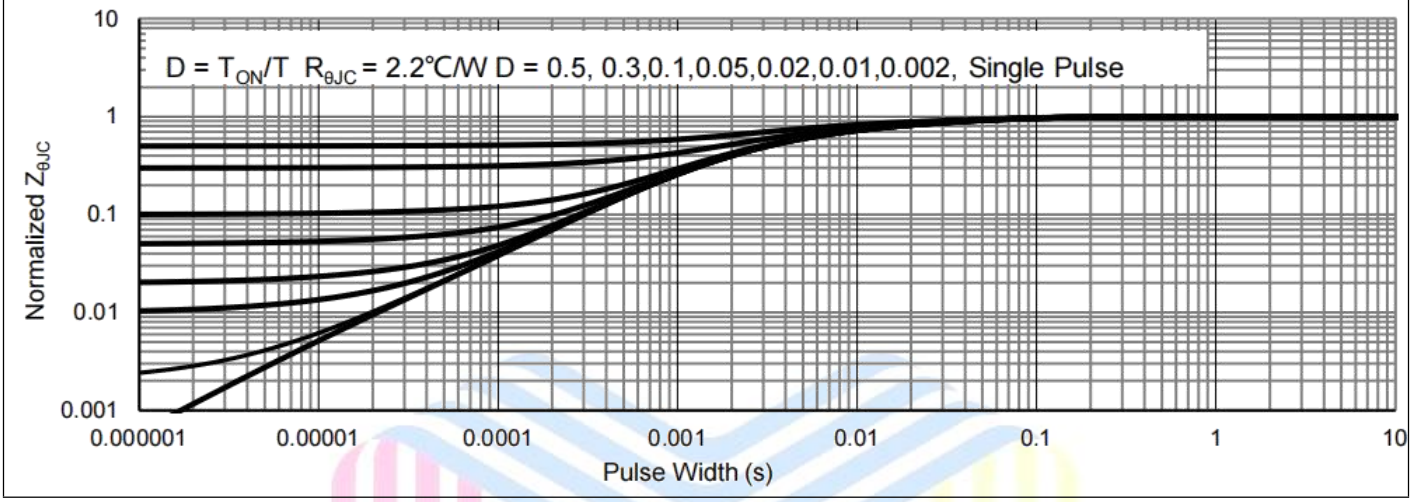
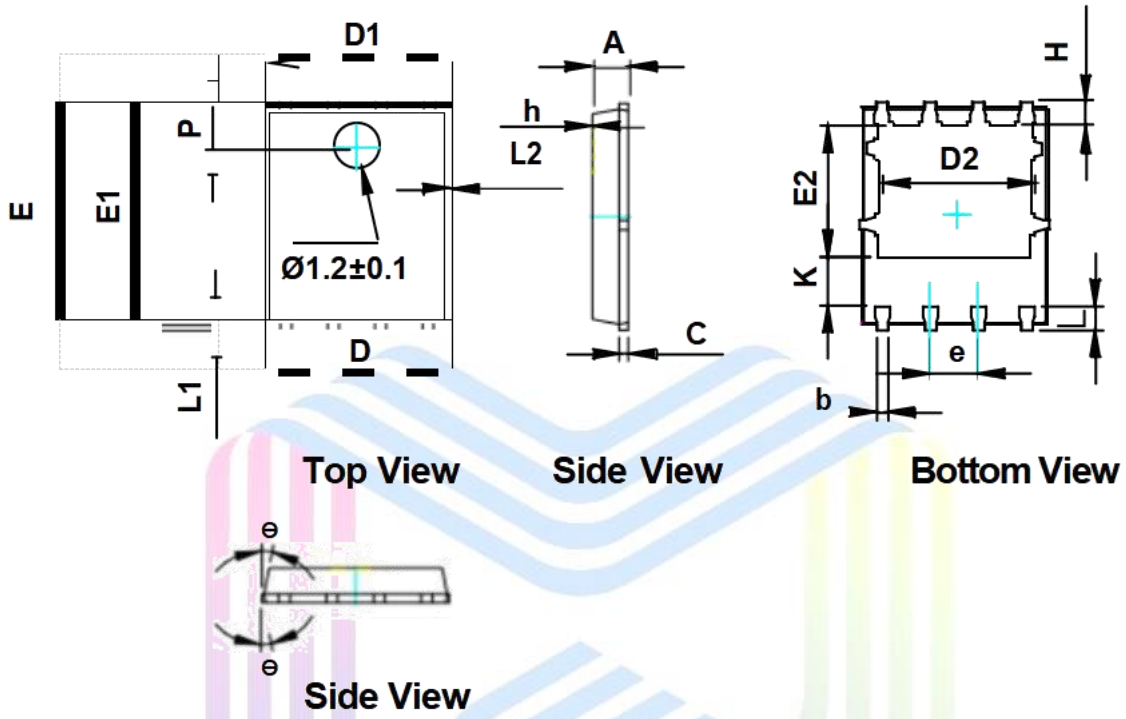


Figure 13: Normalized Maximum Transient Thermal Impedance



Mechanical Dimensions (PDFN5×6 Unit: mm)



COMMON DIMENSIONS: (UNITS OF MEASURE = MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.90	1.00	1.10
b	0.20	0.30	0.40
c	0.21	0.25	0.34
D			5.10
D1	4.80	4.90	5.00
D2	3.91	4.01	4.11
e		1.27 BSC	
E	5.90	6.00	6.10
E1	5.65	5.75	5.85
E2	3.375	3.475	3.575
H	0.55	0.65	0.75
h	-	-	0.05
K	1.20	-	-
L	0.55	0.65	0.75
L1	0.05	0.15	0.25
L2	-	-	0.12
θ	8°	10°	12°
P	1.00	1.10	1.20

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