

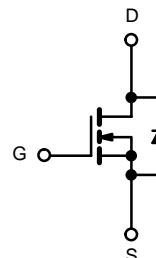
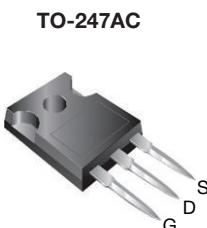
# RFG40N10-VB Datasheet

## N-Channel 100-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.035 at $V_{GS} = 10$ V	85

### FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 %  $R_g$  Tested



N-Channel MOSFET

### APPLICATIONS

- Isolated DC/DC Converters

ABSOLUTE MAXIMUM RATINGS $T_C = 25$ °C, unless otherwise noted			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C)	$I_D$	85	A
		60	
Pulsed Drain Current	$I_{DM}$	150	
Avalanche Current	$I_{AS}$	39	
Single Pulse Avalanche Energy <sup>b</sup>	$E_{AS}$	61	mJ
Maximum Power Dissipation <sup>b</sup>	$P_D$	375 <sup>c</sup>	W
		3.75	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	0.4	

Notes:

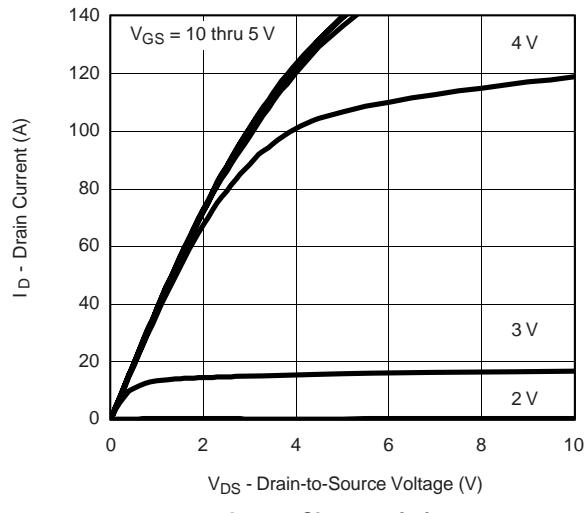
- Package limited.
- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.
- When Mounted on 1" square PCB (FR-4 material).

<b>SPECIFICATIONS</b> $T_J = 25^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{DS}} = 0 \text{ V}, I_D = 250 \mu\text{A}$	100			V
Gate-Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = 250 \mu\text{A}$	1		3	
Gate-Body Leakage	$I_{\text{GSS}}$	$V_{\text{DS}} = 0 \text{ V}, V_{\text{GS}} = \pm 20 \text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = 100 \text{ V}, V_{\text{GS}} = 0 \text{ V}$			1	$\mu\text{A}$
		$V_{\text{DS}} = 100 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 125^\circ\text{C}$			50	
		$V_{\text{DS}} = 100 \text{ V}, V_{\text{GS}} = 0 \text{ V}, T_J = 175^\circ\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{\text{D}(\text{on})}$	$V_{\text{DS}} \geq 5 \text{ V}, V_{\text{GS}} = 10 \text{ V}$	40			A
Drain-Source On-State Resistance <sup>a</sup>	$r_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}$		0.035		$\Omega$
		$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 125^\circ\text{C}$		0.063		
		$V_{\text{GS}} = 10 \text{ V}, I_D = 30 \text{ A}, T_J = 175^\circ\text{C}$		0.084		
Forward Transconductance <sup>a</sup>	$g_{\text{fs}}$	$V_{\text{DS}} = 15 \text{ V}, I_D = 30 \text{ A}$	25			S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}} = 0 \text{ V}, V_{\text{DS}} = 25 \text{ V}, f = 1 \text{ MHz}$		5100		pF
Output Capacitance	$C_{\text{oss}}$			480		
Reverse Transfer Capacitance	$C_{\text{rss}}$			210		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{\text{DS}} = 100 \text{ V}, V_{\text{GS}} = 10 \text{ V}, I_D = 65 \text{ A}$		90		nC
Gate-Source Charge <sup>c</sup>	$Q_{\text{gs}}$			23		
Gate-Drain Charge <sup>c</sup>	$Q_{\text{gd}}$			34		
Gate Resistance	$R_g$		0.5	1.7	3.3	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 100 \text{ V}, R_L = 1.5 \Omega$ $I_D \geq 65 \text{ A}, V_{\text{GEN}} = 10 \text{ V}, R_g = 2.5 \Omega$		24	35	ns
Rise Time <sup>c</sup>	$t_r$			220	330	
Turn-Off Delay Time <sup>c</sup>	$t_{\text{d}(\text{off})}$			45	70	
Fall Time <sup>c</sup>	$t_f$			200	300	
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25^\circ\text{C}^b$						
Continuous Current	$I_S$			85		A
Pulsed Current	$I_{\text{SM}}$			150		
Forward Voltage <sup>a</sup>	$V_{\text{SD}}$	$I_F = 65 \text{ A}, V_{\text{GS}} = 0 \text{ V}$		1.0	1.5	V
Reverse Recovery Time	$t_{\text{rr}}$	$I_F = 50 \text{ A}, \text{di/dt} = 100 \text{ A}/\mu\text{s}$		130	200	ns
Peak Reverse Recovery Current	$I_{\text{RM}(\text{REC})}$			8	12	A
Reverse Recovery Charge	$Q_{\text{rr}}$			0.52	1.2	$\mu\text{C}$

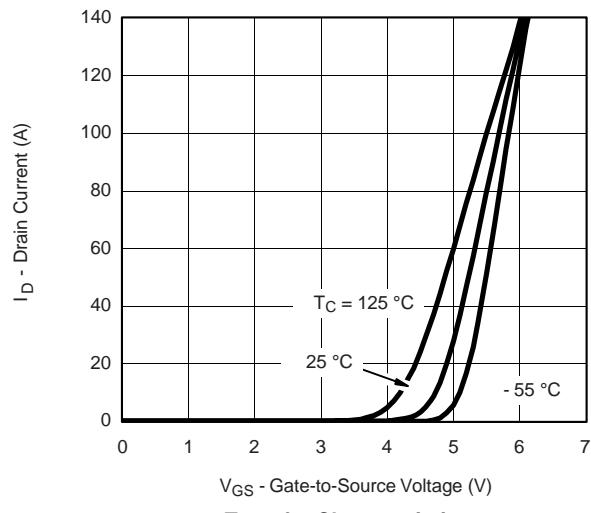
Notes:

- a. Pulse test; pulse width  $\leq 300 \mu\text{s}$ , duty cycle  $\leq 2 \%$ .
- b. Guaranteed by design, not subject to production testing.
- c. Independent of operating temperature.

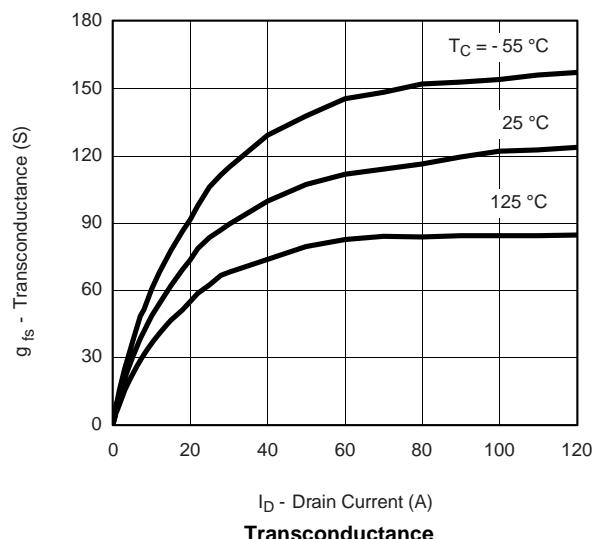
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


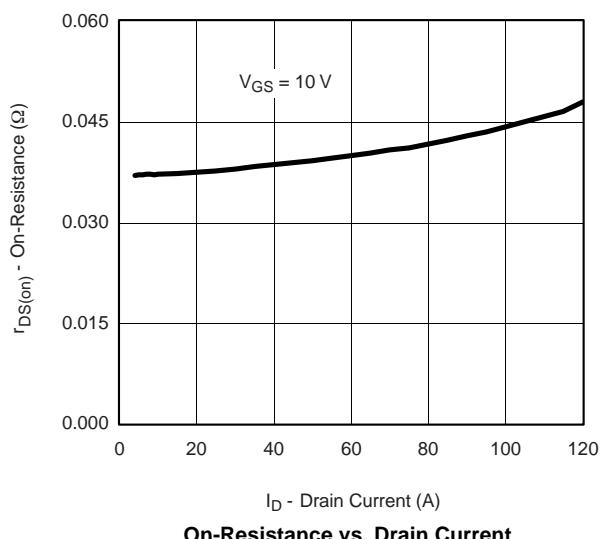
Output Characteristics



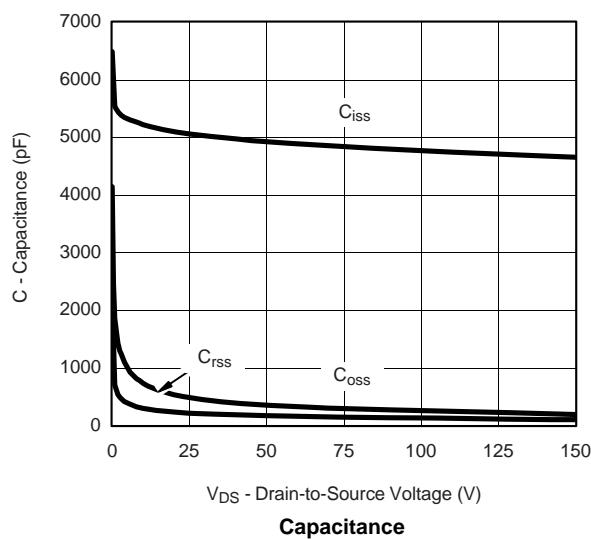
Transfer Characteristics



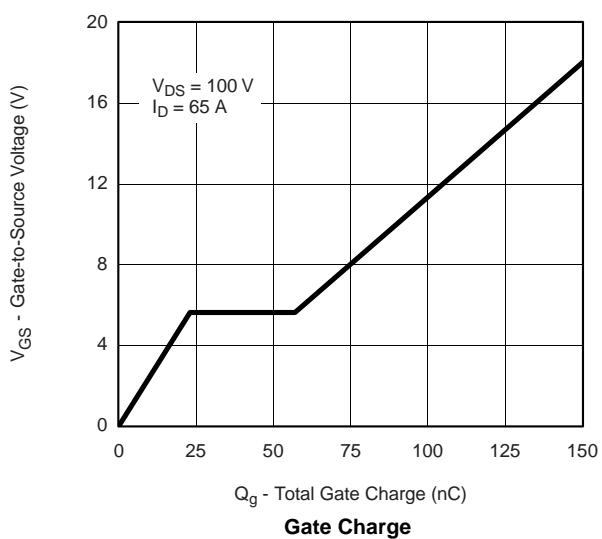
Transconductance



On-Resistance vs. Drain Current

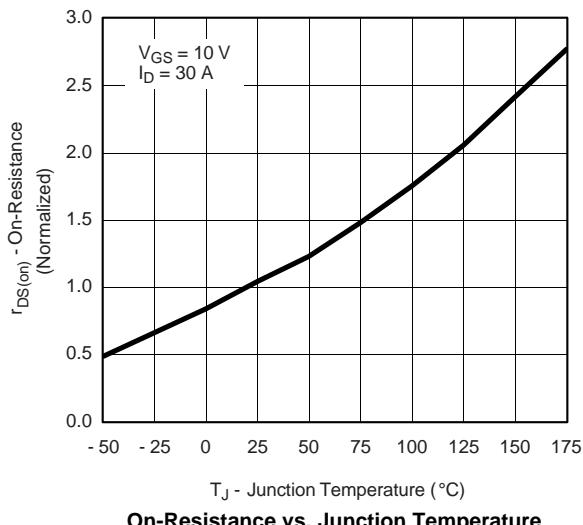


Capacitance

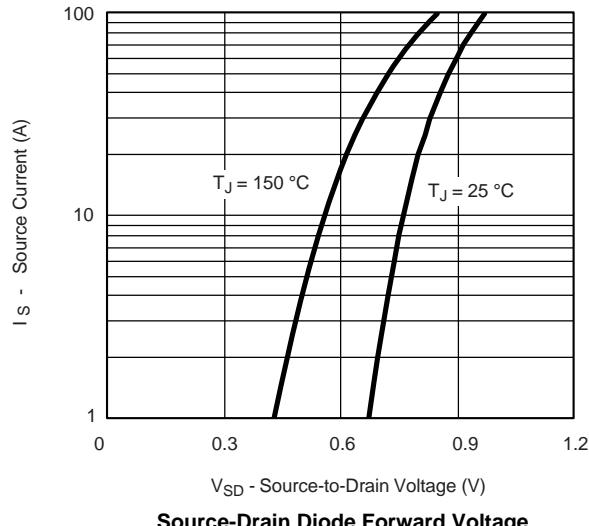


Gate Charge

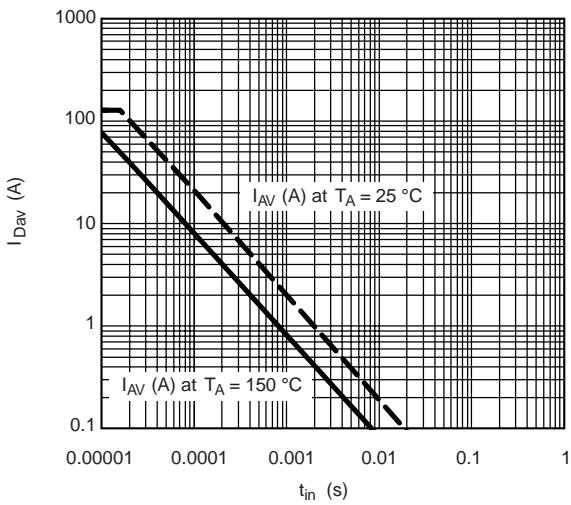
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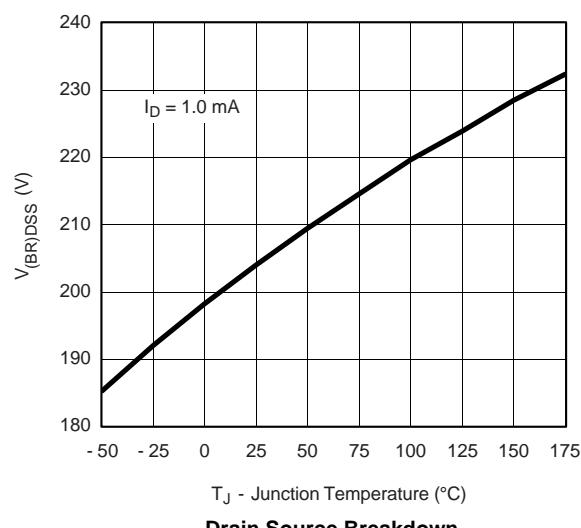
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

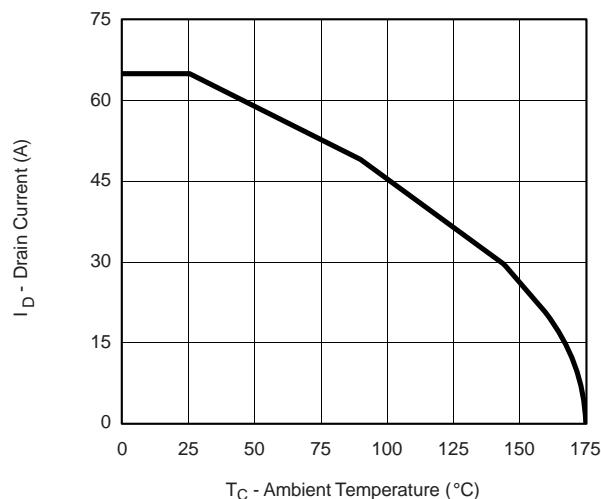


Avalanche Current vs. Time

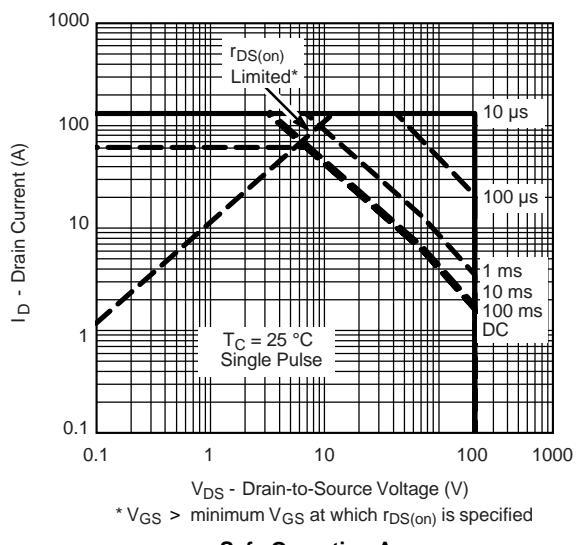


Drain Source Breakdown  
vs. Junction Temperature

## THERMAL RATINGS

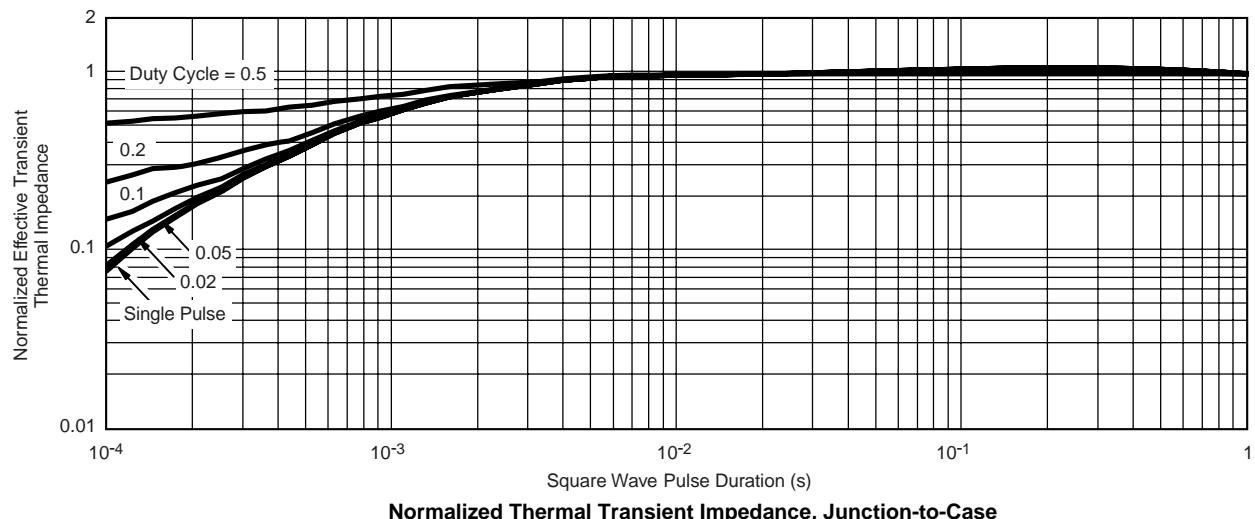


**Maximum Avalanche and Drain Current  
vs. Case Temperature**



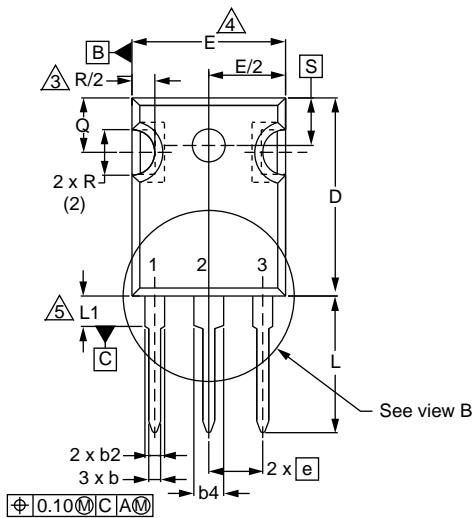
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $r_{DS(on)}$  is specified

**Safe Operating Area**

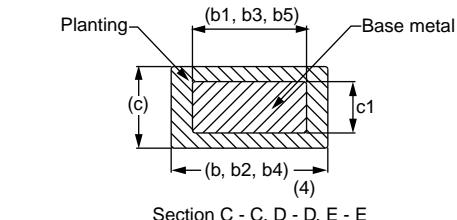
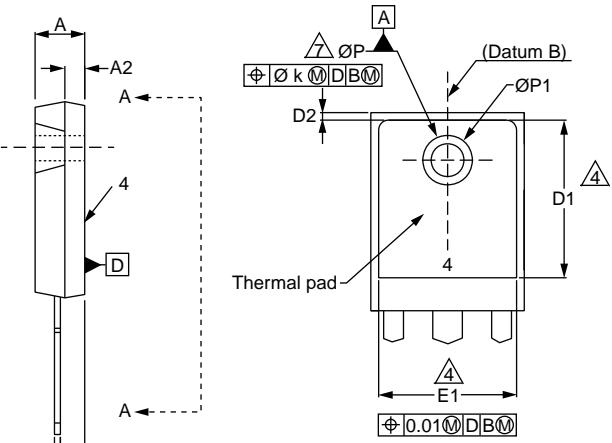


**Normalized Thermal Transient Impedance, Junction-to-Case**

## TO-247AC



Lead Assignments  
 1. Gate  
 2. Drain  
 3. Source  
 4. Drain



View B

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.58	5.31	0.180	0.209
A1	2.21	2.59	0.087	0.102
A2	1.17	2.49	0.046	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.53	2.39	0.060	0.094
b3	1.65	2.37	0.065	0.093
b4	2.42	3.43	0.095	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.86	0.015	0.034
c1	0.38	0.76	0.015	0.030
D	19.71	20.82	0.776	0.820
D1	13.08	-	0.515	-

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

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