

**Product Summary**

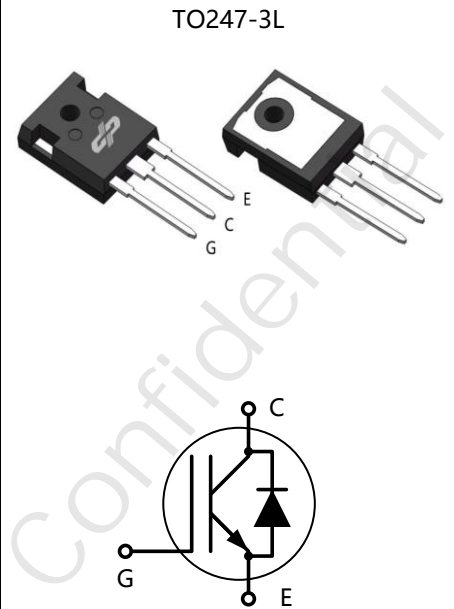
Part #	$V_{CE}$	$I_C$	$V_{CEsat} T_{vj}=25^{\circ}C$
DP40N65KBE2	650V	40A	1.5V

**Features**

- Uses advanced FS IGBT technology
- Excellent conduction and switching loss
- Excellent stability and uniformity
- Fast and soft antiparallel diode

**Applications**

- Induction converters
- Uninterruptible power supplies
- Home Appliances


**Package Marking and Ordering Information**

Part #	Marking	Package	Packing
DP40N65KBE2	40N65KBE2	TO247-3L	Tube


**Absolute Maximum Ratings**

Parameter	Symbol	Value	Unit
Collector-Emmitter voltage	$V_{CE}$	650	V
Continuous collector current $T_C = 25^{\circ}C$ $T_C = 100^{\circ}C$	$I_C$	80 40	A
Pulsed collector current ( $T_C = 25^{\circ}C$ , $t_p$ limited by $T_{jmax}$ )	$I_{D\ pulse}$	160	A
Turn off safe operating area $V_{CE} \leq 650V$ , $T_{vj} \leq 175^{\circ}C$	-	160	A
Diode forward current $T_C = 25^{\circ}C$ $T_C = 100^{\circ}C$	$I_F$	80 40	A
Diode pulsed current ( $T_C = 25^{\circ}C$ , $t_p$ limited by $T_{jmax}$ )	$I_{F\ pulse}$	160	A
Gate-emitter voltage	$V_{GE}$	$\pm 30$	V
Power dissipation ( $T_C = 25^{\circ}C$ )	$P_{tot}$	300	W
Operating junction temperature	$T_j, T_{stg}$	-40...+175	$^{\circ}C$
Storage temperature	$T_j, T_{stg}$	-55...+150	$^{\circ}C$

**Thermal Resistance**

Parameter	Symbol	Max	Unit
IGBT thermal resistance, junction case. Max	$R_{thJC}$	0.50	°C/W
Diode thermal resistance, junction case. Max	$R_{thJC}$	1.5	
Thermal resistance, junction – ambient. Max	$R_{thJA}$	40	

**Electrical Characteristic (at  $T_j = 25^\circ\text{C}$ , unless otherwise specified)**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Collector-emitter breakdown voltage	$V_{(BR)CES}$	650	-	-	V	$V_{GE}=0V, I_C=250\mu A$
Collector-emitter saturation voltage	$V_{CEsat}$	-	1.5	1.85	V	$V_{GE} = 15V, I_C = 40A$ $T_{vj}=25^\circ\text{C}$
		-	1.85	-		$T_{vj}=150^\circ\text{C}$
Diode forward voltage	$V_F$	-	1.4	2	V	$V_{GE} = 0V, I_F = 40A$ $T_{vj}=25^\circ\text{C}$
		-	1.9	-		$T_{vj}=150^\circ\text{C}$
Gate-emitter threshold voltage	$V_{GE(th)}$	3.5	4.5	5.5	V	$V_{GE} = V_{CE}, I_C = 1mA$
Zero gate voltage collector current	$I_{CES}$	-	-	1	$\mu A$	$V_{CE}=650V, V_{GS}=0V$ $T_{vj}=25^\circ\text{C}$
		-	100	-		$T_{vj}=150^\circ\text{C}$
Gate-emitter leakage current	$I_{GES}$	-	-	100	nA	$V_{CE} = 0V, V_{GE} = 20V$
Transconductance	$g_{fs}$	-	14	-	S	$V_{CE} = 20V, I_{CE} = 40A$

**Dynamic Characteristic**

Input Capacitance	$C_{ies}$	-	3215	-	pF	$V_{CE} = 25V, V_{GE} = 0V,$ $f = 1MHz$
Output Capacitance	$C_{oes}$	-	155	-		
Reverse Transfer Capacitance	$C_{res}$	-	23	-		
Gate Total Charge	$Q_g$	-	115	-	nC	$V_{CC} = 520V, I_C = 40A,$ $V_{GE} = 15V$
Gate-Source charge	$Q_{ge}$	-	37	-		
Gate-Drain charge	$Q_{gc}$	-	30	-		
Turn-on delay time	$t_{d(on)}$	-	27	-	ns	$T_{vj} = 25^\circ C,$ $V_{CC} = 400V, I_C = 40A,$ $V_{GE} = 15.0V,$ $R_G = 10.0\Omega$
Rise time	$t_r$	-	57	-		
Turn-off delay time	$t_{d(off)}$	-	118	-		
Fall time	$t_f$	-	62	-		
Turn-on energy	$E_{on}$	-	0.72	-	mJ	
Turn-off energy	$E_{off}$	-	0.85	-		

**Diode Characteristic**

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Diode peak reverse recovery current	$I_{rrm}$	-	8.7	-	A	$T_{vj} = 25^\circ C,$ $V_R = 400V,$ $I_F = 40.0A,$ $diF/dt = 500A/\mu s$
Body Diode Reverse Recovery Time	$t_{rr}$	-	145	-	ns	
Body Diode Reverse Recovery Charge	$Q_{rr}$	-	560	-	nC	

## Typical Performance Characteristics

Fig 1: Output Characteristics

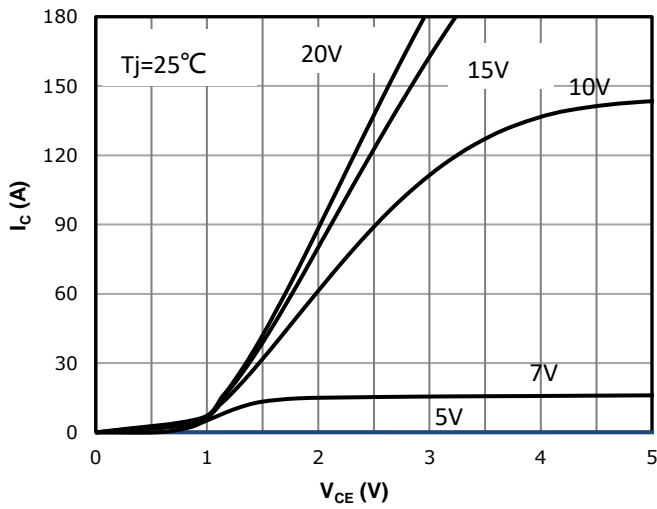


Fig 2: Output Characteristics

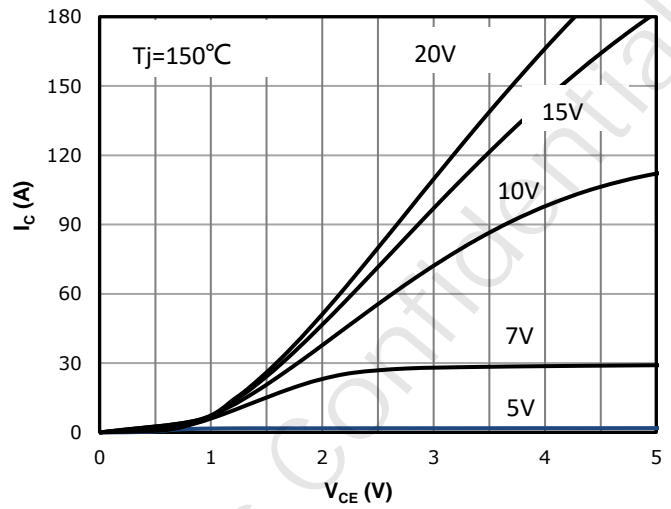


Fig 3: Transfer Characteristics

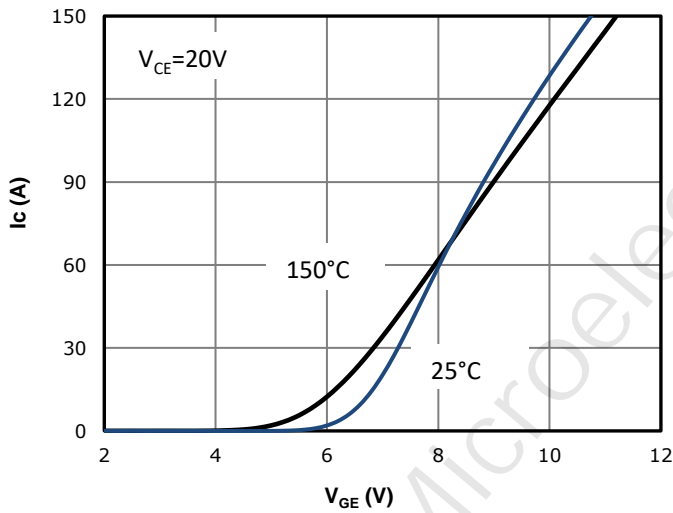


Fig 4: Typical collector-emitter voltage

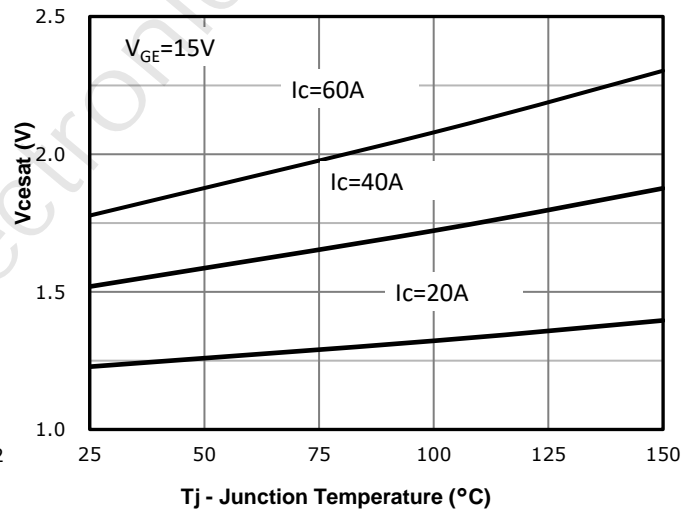


Fig 5: Gate Charge Characteristics

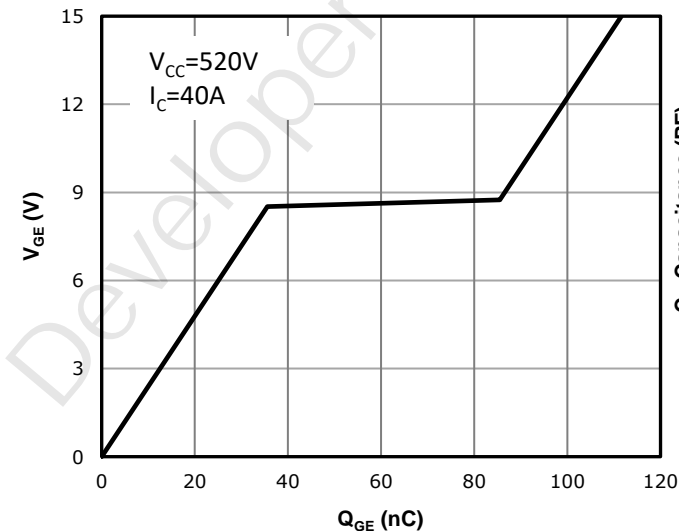


Fig 6: Capacitance Characteristics

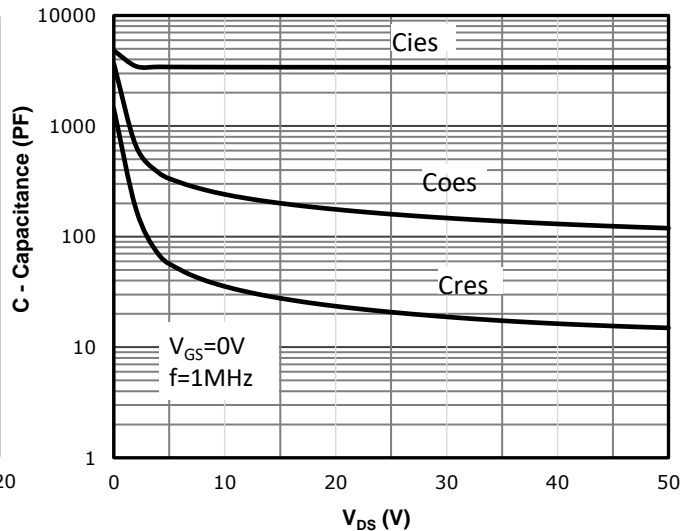


Fig 7: Typical switching energy losses

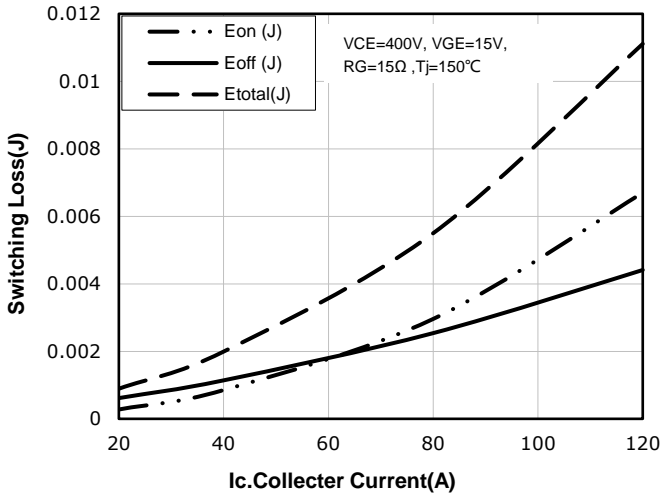


Fig 8: Typical switching times as a function of gate resistor

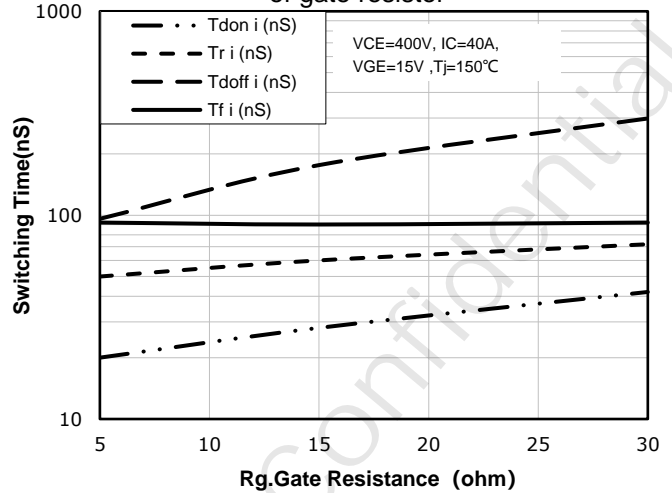


Fig 9: Typical switching energy losses as a function of gate resistor

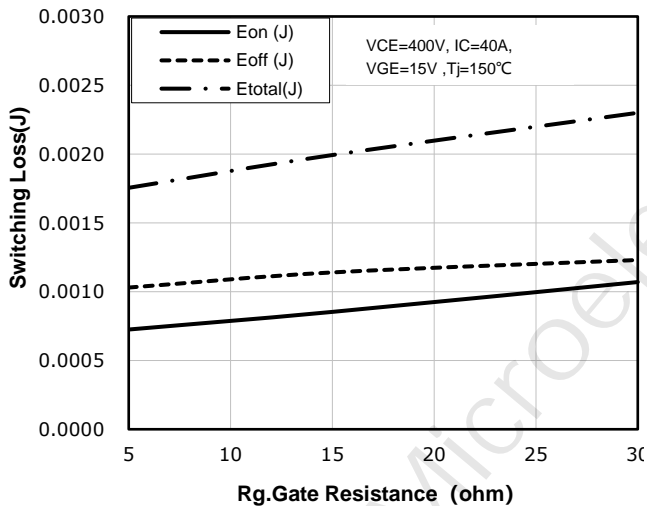


Fig 10: Typical switching energy losses as a function of collector emitter voltage

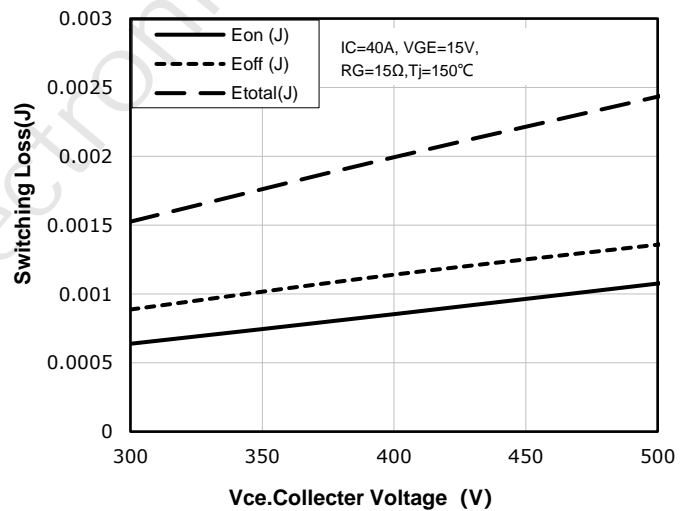


Fig 11: Typical switching times as a function of junction temperature

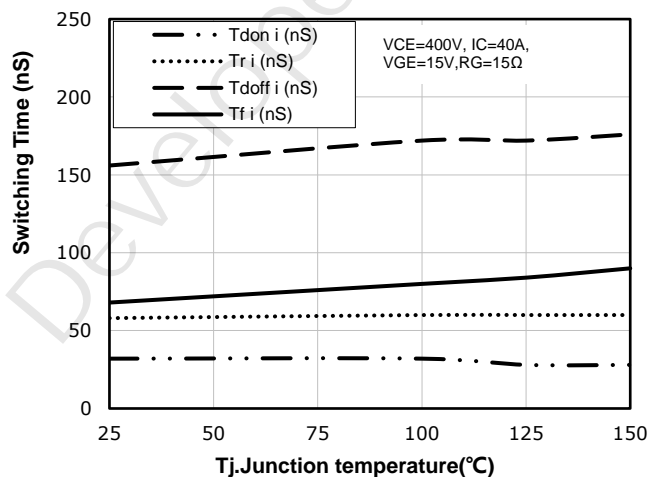


Fig 12: Typical switching energy losses as a function of junction temperature

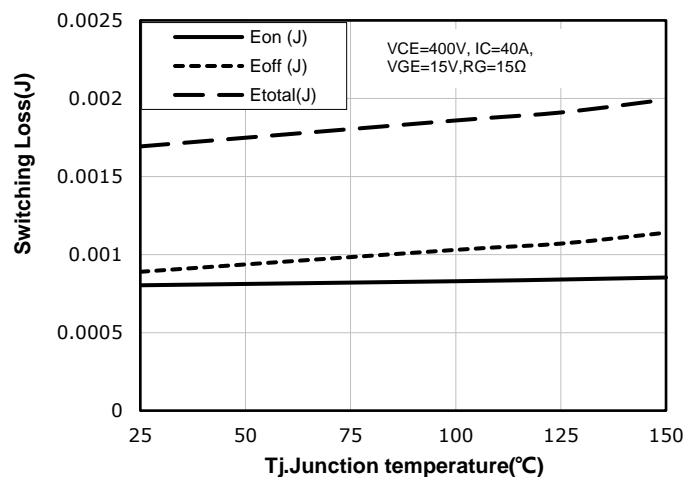
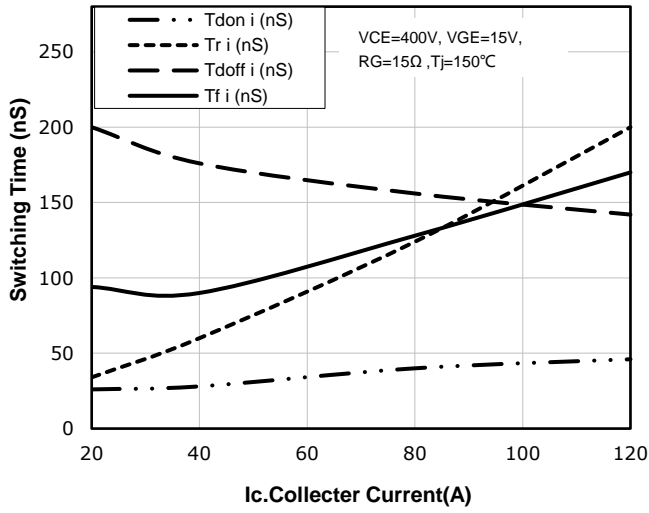
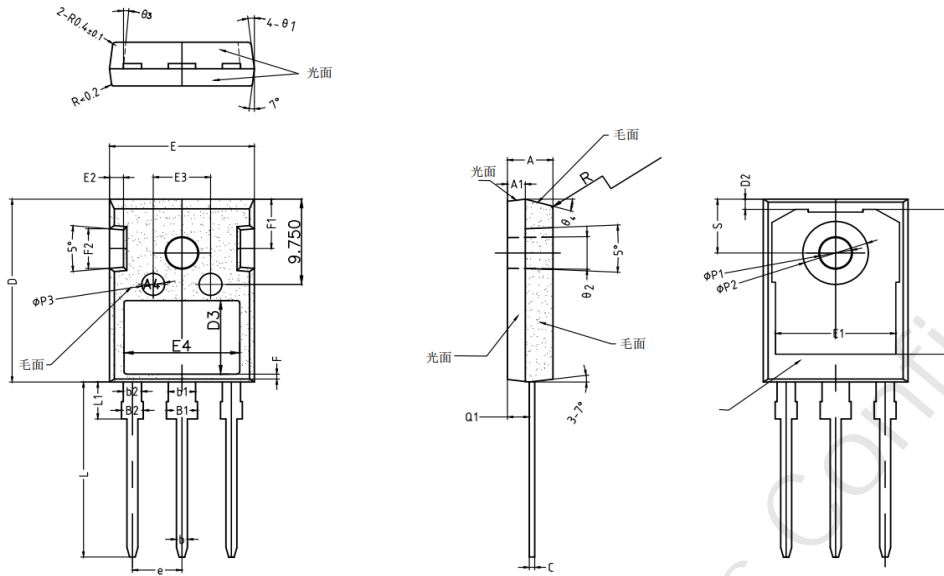


Fig 13: Typical switching times

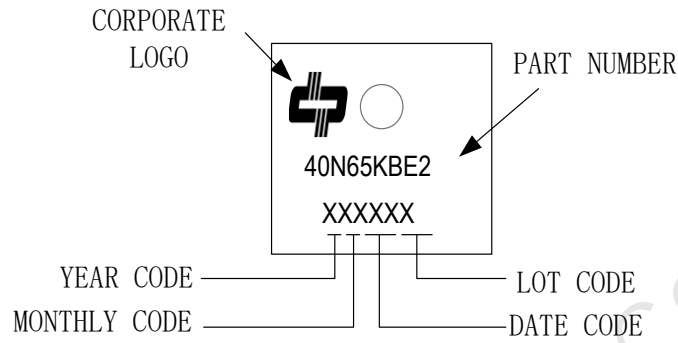


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**Package Outline: TO247-3L**


Symbol	Dimensions In Millimeters		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	2.95	3.00	3.05
b2	1.95	2.00	2.05
B1	3.00	3.10	3.20
B2	1.90	2.00	2.10
c	0.55	0.60	0.65
D	20.90	21.00	21.10
D1	16.45	16.55	16.65
D2	1.07	1.17	1.27
D3	8.15	8.20	8.25
E	15.70	15.80	15.90
E1	13.16	13.26	13.36
E2	2.40	2.50	2.60
E3	6.10	6.20	6.30
E4	12.70	12.80	12.90
F	0.75	0.85	0.95
F1	5.70	5.80	5.90
F2	4.90	5.00	5.10
F3	9.90	10.00	10.10
e	5.44 BSC		
L	19.72	19.92	20.12
L1	4.03	4.13	4.23
$\theta 1$	5°	7°	9°
$\theta 2$	1°	2°	3°
$\theta 3$	4°	5°	6°
$\theta 4$	13°	15°	17°
$\phi P1$	3.50	3.60	3.70
$\phi P2$	7.09	7.19	7.29
$\phi P3$	2.40	2.50	2.60
Q1	2.31	2.41	2.51
S	6.05	6.15	6.25
R	0.30	0.40	0.50

**Part Marking Information**



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## Revision History

Revision	Major changes
1.0	Release for initial version1.0

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