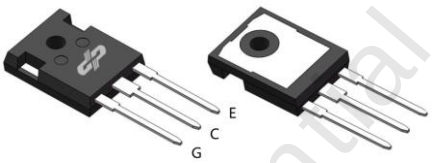
DP40N65KBDSI2

650V, 40A Power IGBT with Diode

Product Summary

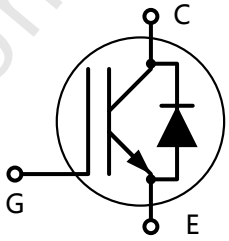
Part #	V_{CE}	I_C	V_{CEsat}, T_{vj}=25℃
DP40N65KBDSI2	650V	40A	1.5V

TO247-3L



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
DP40N65KBDSI2	40N65KBDSI2	TO247-3L	Tube

Halogen-Free

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-Emmiter voltage	V_{CE}	650	V
Continuous collector current T_C = 25°C T_C = 100°C	I_C	 80 40	A
Pulsed collector current (T_C = 25°C, t_p limited by T_{jmax})	$I_{D\ pulse}$	160	A
Turn off safe operating area V_{CE} ≤ 650V, T_{vj} ≤ 175°C	-	160	A
Diode forward current T_C = 25°C T_C = 100°C	I_F	 80 40	A
Diode pulsed current (T_C = 25°C, t_p limited by T_{jmax})	$I_{F\ pulse}$	160	A
Gate-emitter voltage	V_{GE}	±30	V
Short circuit withstand time V_{GE} = 15.0V, V_{CC} < 400V	t_{sc}	5	μs
Power dissipation (T_C = 25°C)	P_{tot}	300	W
Operating junction temperature	T_j , T_{stg}	-40...+175	°C
Storage temperature	T_j , T_{stg}	-55...+150	°C

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Thermal Resistance

Parameter	Symbol	Max	Unit
IGBT thermal resistance,junction case. Max	R_{thJC}	0.5	°C/W
Diode thermal resistance,junction case. Max	R_{thJC}	1.2	
Thermal resistance, junction – ambient. Max	R_{thJA}	40	

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Collector-emitter breakdown voltage	$V_{(BR)CES}$	650	-	-	V	V_{GE}=0V, I_C=250uA
Collector-emitter saturation voltage	V_{CEsat}	-	1.5	1.9	V	V_{GE} = 15V, I_C = 40A T_{vj}=25°C
		-	2	-		T_{vj}=150°C
Diode forward voltage	V_F	-	1.4	2	V	VGE = 0V, IF = 40A T_{vj}=25°C
		-	1.3	-		T_{vj}=150°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	μA	V_{CE}=650V,V_{GS}=0V T_{vj}=25°C
		-	100	-		T_{vj}=150°C
Gate-emitter leakage current	I_{GES}	-	-	100	nA	V_{CE} = 0V, V_{GE} = 20V

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Dynamic Characteristic

Input Capacitance	C_{ies}	-	3455	-	pF	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz
Output Capacitance	C_{oes}	-	116	-		
Reverse Transfer Capacitance	C_{res}	-	27	-		
Gate Total Charge	Q_g	-	128	-	nC	VCC = 520V, IC =40A, VGE = 15V
Gate-Source charge	Q_{ge}	-	34	-		
Gate-Drain charge	Q_{gc}	-	30	-		
Turn-on delay time	$t_{d(on)}$	-	28	-	ns	Tvj = 25°C, VCC=400V, IC=15A, VGE=15.0V, RG=10.0Ω
Rise time	t_r	-	56	-		
Turn-off delay time	$t_{d(off)}$	-	114	-		
Fall time	t_f	-	62	-		
Turn-on energy	E_{on}	-	0.77	-	mJ	
Turn-off energy	E_{off}	-	0.48	-		

Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Diode peak reverse recovery curren	I_{rrm}	-	-5	-	A	T_{vj} = 25°C, V_R = 400V, IF = 15.0A, diF /dt = 200A/μs
Body Diode Reverse Recovery Time	t_{rr}	-	166	-	ns	
Body Diode Reverse Recovery Charge	Q_{rr}	-	360	-	nC	

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Typical Performance Characteristics

Fig 1: Output Characteristics

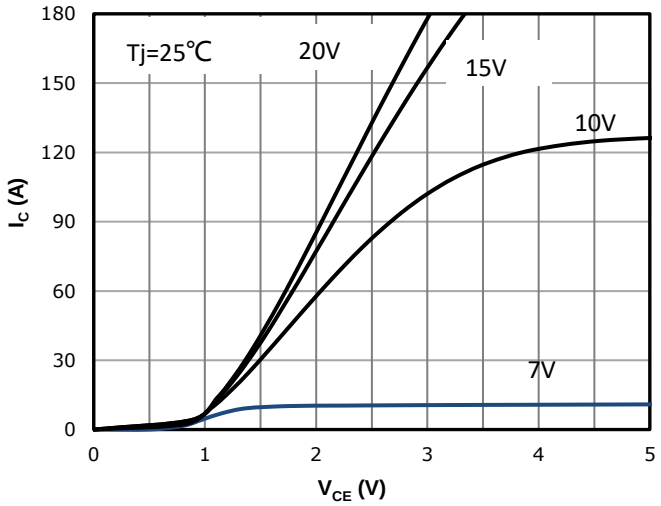


Fig 2: Output Characteristics

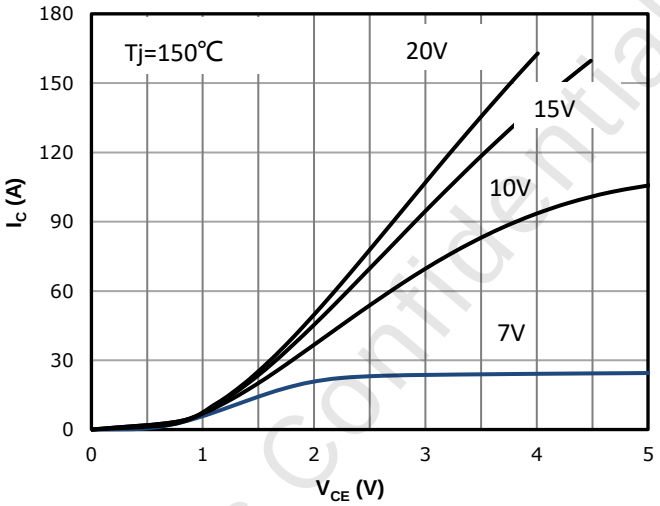


Fig 3: Transfer Characteristics

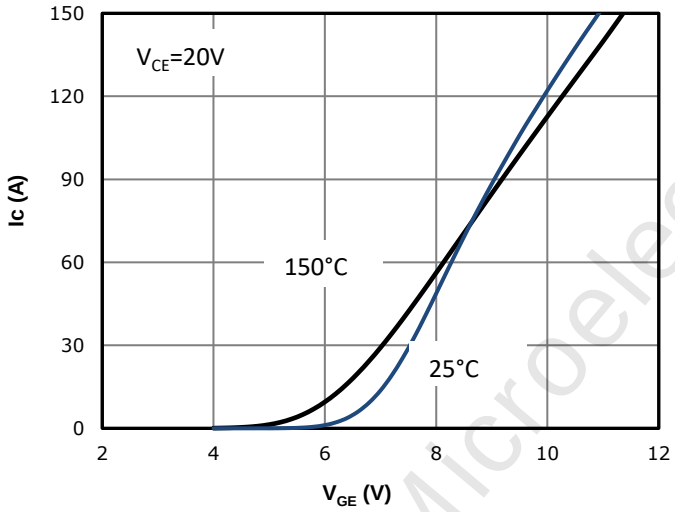


Fig 4: Typical collector-emitter voltage

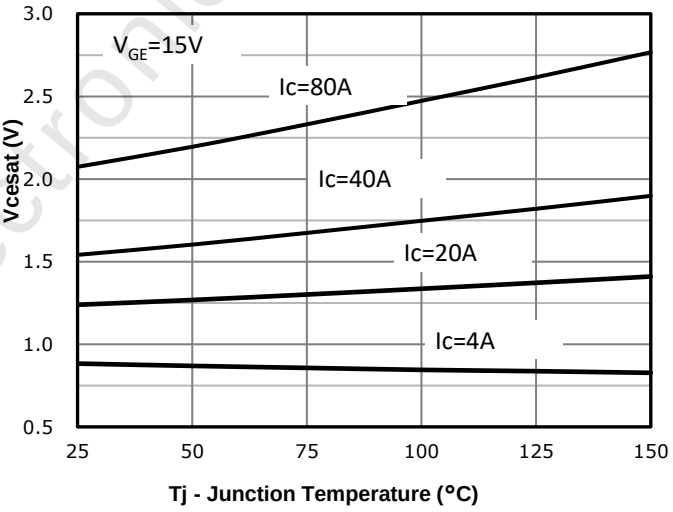


Fig 5: Gate Charge Characteristics

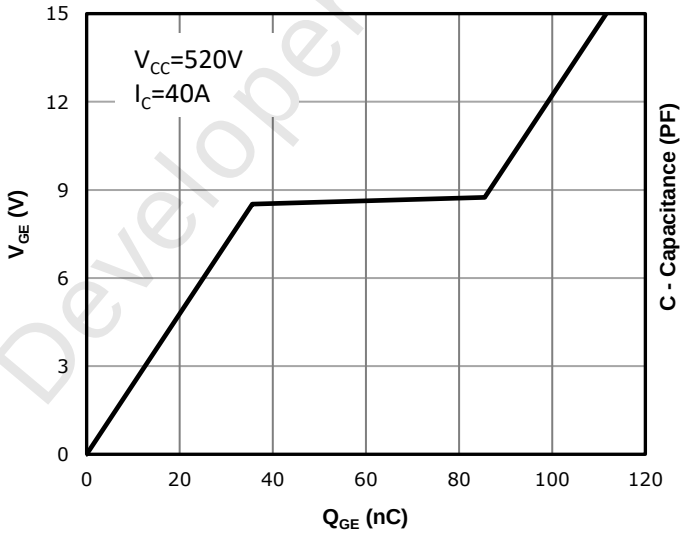
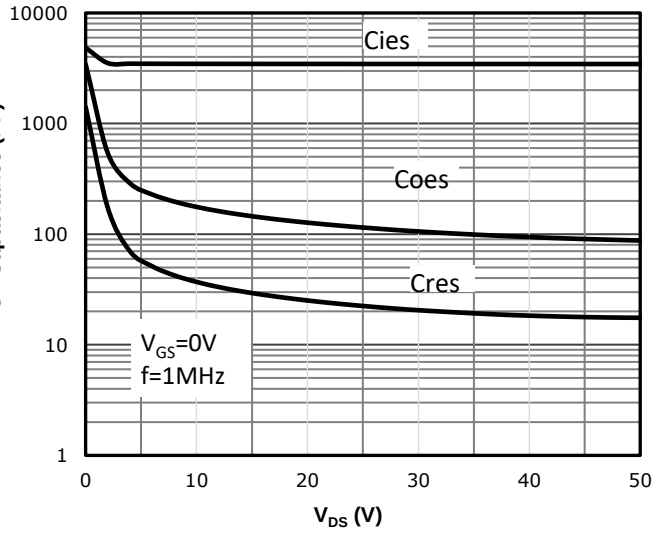


Fig 6: Capacitance Characteristics



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Fig 7: Typical switching energy losses

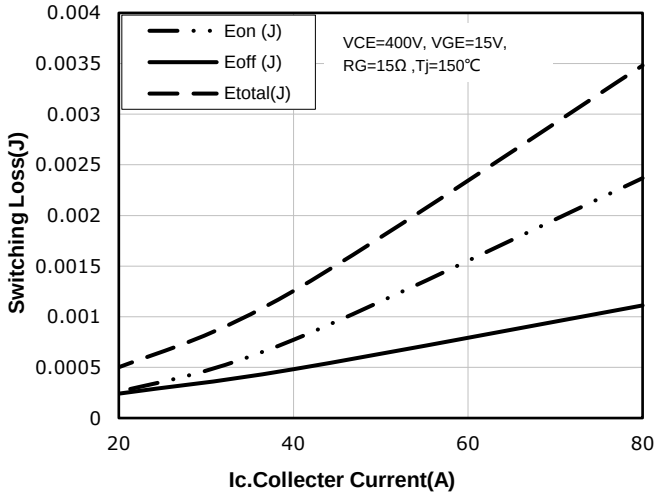


Fig 8: Typical switching times as a function of gate resistor

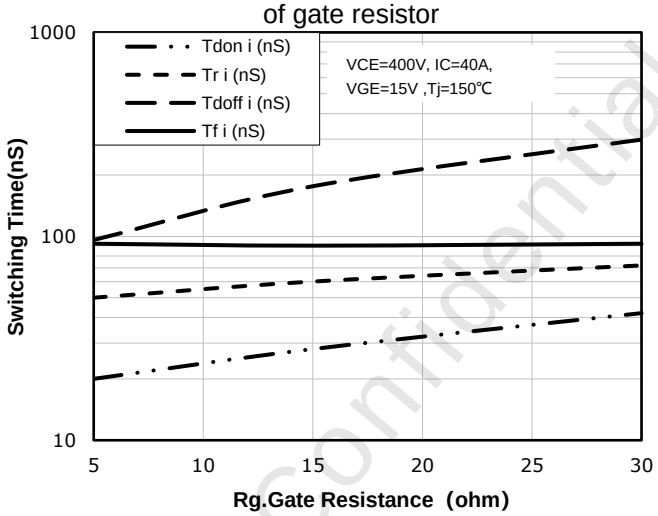


Fig 9: Typical switching energy losses as a function of gate resistor

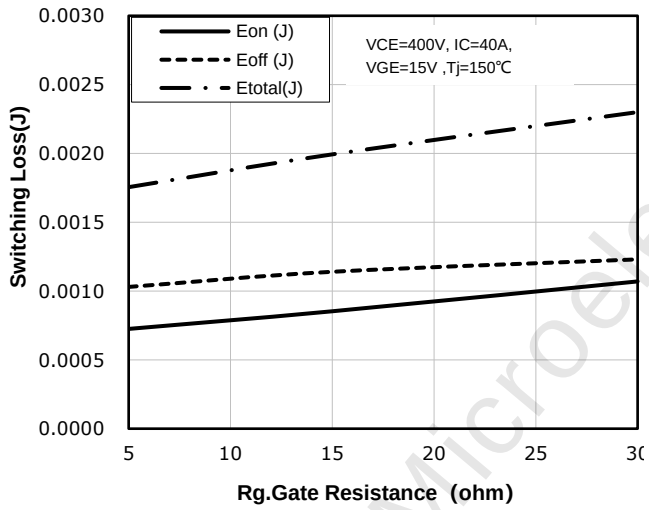


Fig 10: Typical switching energy losses as a function of collector emitter voltage

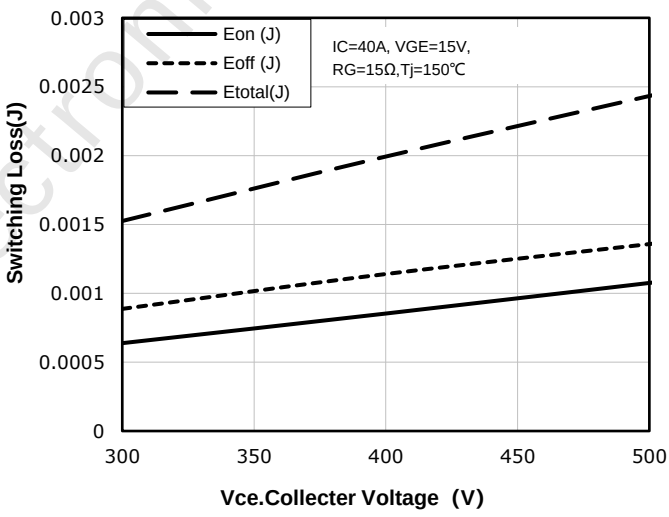


Fig 11: Typical switching times as a function of junction temperature

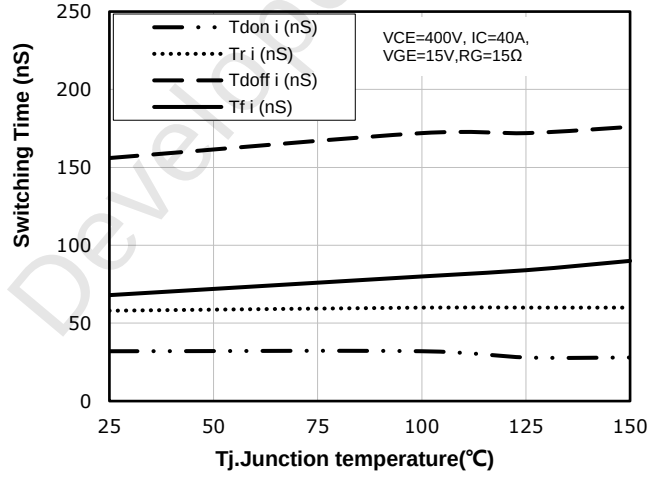
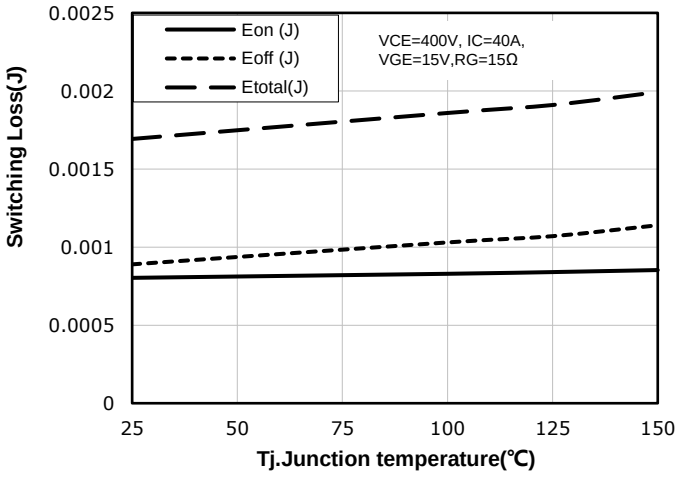
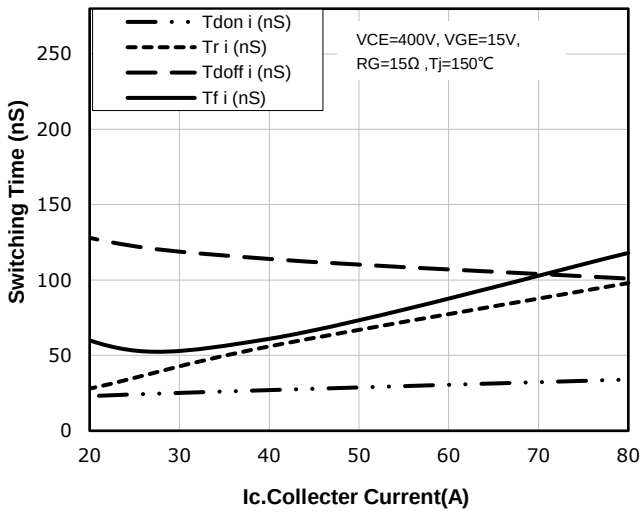


Fig 12: Typical switching energy losses as a function of junction temperature



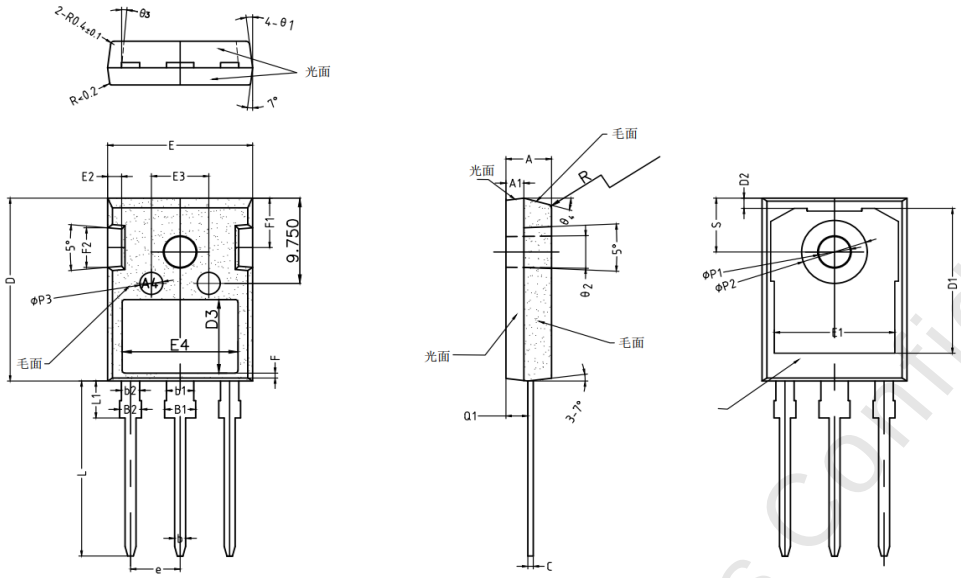
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Fig 13: Typical switching times



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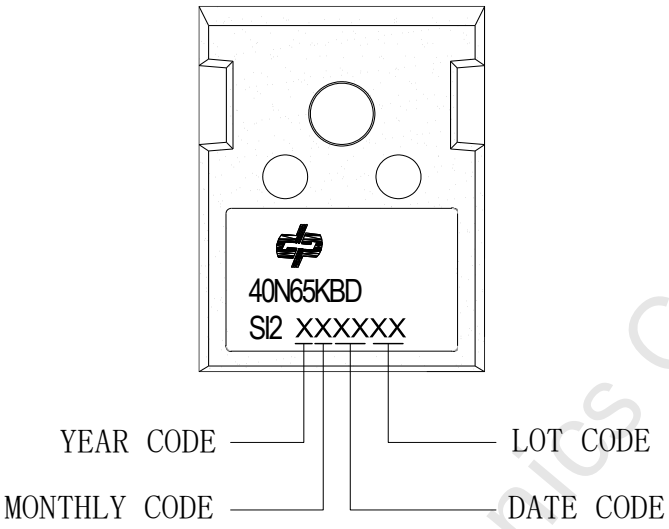
Package Outline: TO247-3L



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
θ1	5°	7°	9°
θ2	1°	2°	3°
θ3	4°	5°	6°
θ4	13°	15°	17°
ΦP1	3.50	3.60	3.70
ΦP2	7.09	7.19	7.29
ΦP3	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

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Part Marking Information



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Revision History

Revison	Major changes
1.25	Release for formal version

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