德普微电子
DEVELOPER MICROELECTRONICS

DP40N65PBDSI3

650V, 40A Power IGBT with Diode

Product Summary

Part #	V_{CE}	I_C	V_{CEsat}, T_{vj}=25°C
DP40N65PBDSI3	650V	40A	1.5V

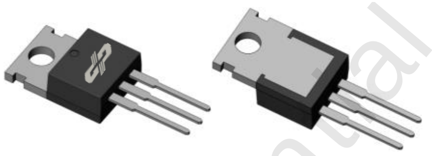
Features

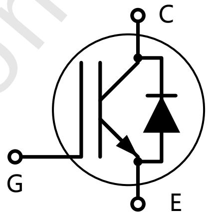
- Uses advanced FS IGBT technology
- Excellent conduction and switching loss
- Excellent stability and uniformity
- Fast and soft antiparallel diode

Applications

- Induction converters
- Uninterruptible power supplies
- Home Appliances

TO-220





Package Marking and Ordering Information

Part #	Marking	Package	Packing
DP40N65PBDSI3	40N65PBDSI	TO-220	Tube

HAL 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
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

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}	1.2	
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 1.85	 1.85 -	V	V_{GE} = 15V, I_C = 40A T_{vj}=25°C T_{vj}=150°C
Diode forward voltage	V_F	 - -	 1.5 1.9	 2 -	V	V_{GE} = 0V, I_F = 40A T_{vj}=25°C 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}	 - -	 - 100	 1 -	μA	V_{CE}=650V,V_{GS}=0V T_{vj}=25°C T_{vj}=150°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}	-	3404	-	pF	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz
Output Capacitance	C_{oes}	-	159	-		
Reverse Transfer Capacitance	C_{res}	-	27	-		
Gate Total Charge	Q_g	-	112	-	nC	V_{CC} = 520V, I_C =40A, V_{GE} = 15V
Gate-Source charge	Q_{ge}	-	35	-		
Gate-Drain charge	Q_{gc}	-	30	-		
Turn-on delay time	$t_{d(on)}$	-	28	-	ns	T_{vj} = 25°C, V_{CC}=400V, I_C=40A, V_{GE}=15.0V, R_G=10.0Ω
Rise time	t_r	-	54	-		
Turn-off delay time	$t_{d(off)}$	-	121	-		
Fall time	t_f	-	65	-		
Turn-on energy	E_{on}	-	0.72	-	mJ	
Turn-off energy	E_{off}	-	0.80	-		

Diode Characteristic

Parameter	**Symbol**	**Value**			**Unit**	**Test Condition**
		min.	**typ.**	**max.**		
Diode peak reverse recovery curren	I_{rrm}	-	-8.7	-	A	T_{vj} = 25°C, V_R = 400V, IF = 40.0A, diF /dt = 500A/μs
Body Diode Reverse Recovery Time	t_{rr}	-	143	-	ns	
Body Diode Reverse Recovery Charge	Q_{rr}	-	556	-	nC	

Typical Performance Characteristics

Fig 1: Output Characteristics

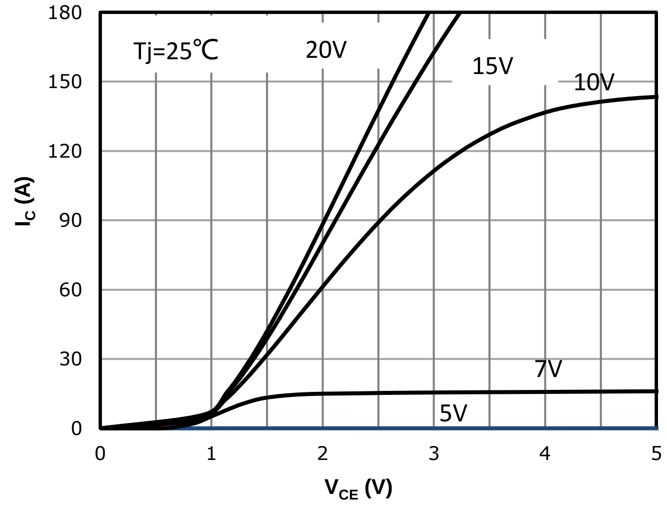


Fig 2: Output Characteristics

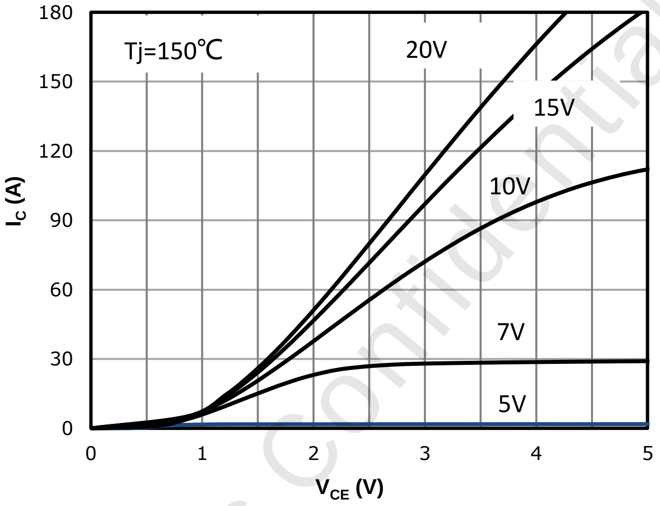


Fig 3: Transfer Characteristics

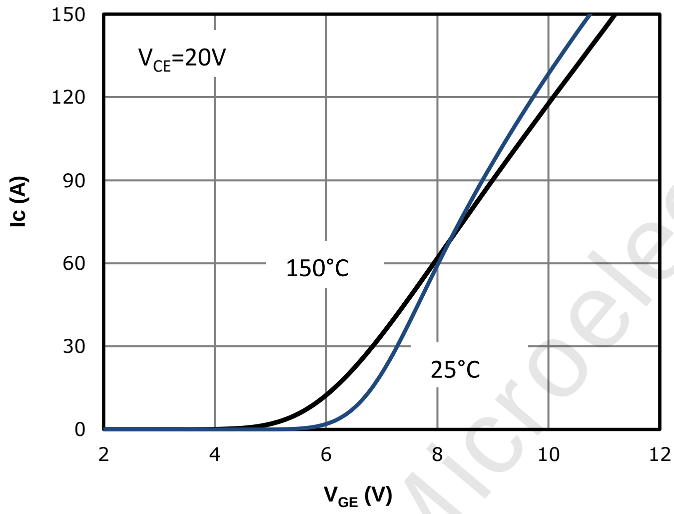


Fig 4: Typical collector-emitter voltage

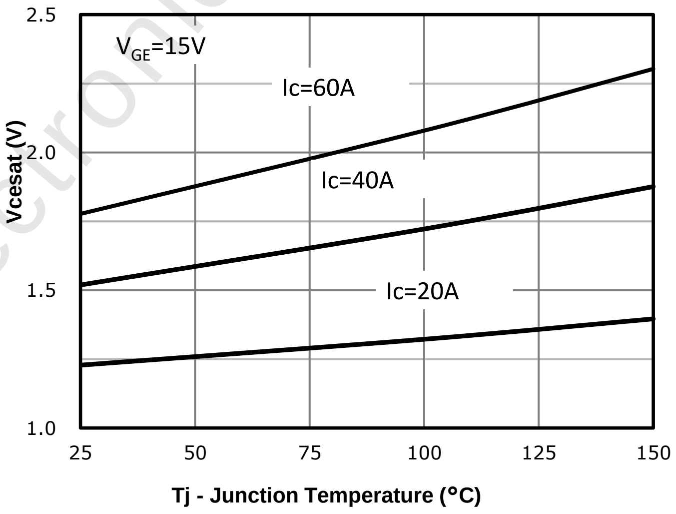


Fig 5: Gate Charge Characteristics

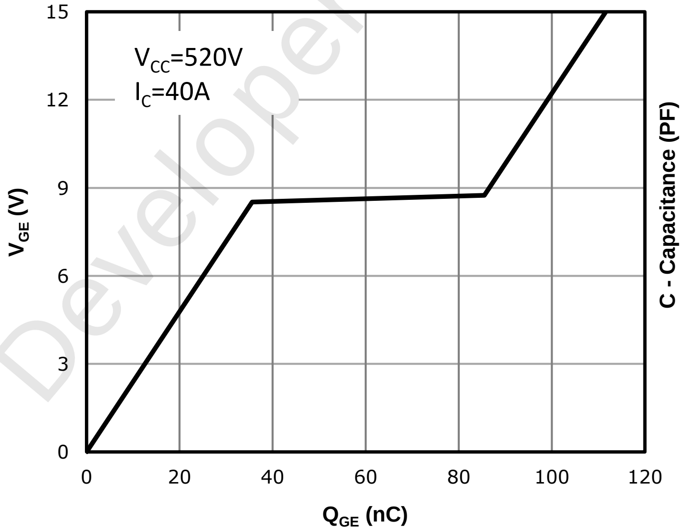


Fig 6: Capacitance Characteristics

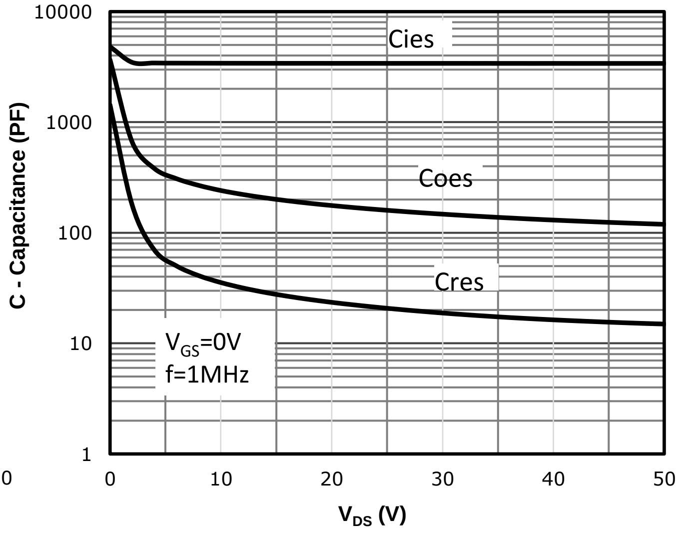


Fig 7: Typical switching energy losses

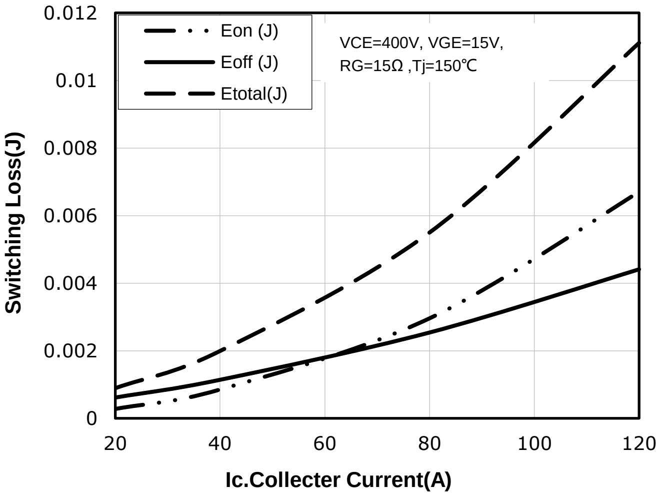


Fig 8：Typical switching times as a function of gate resistor

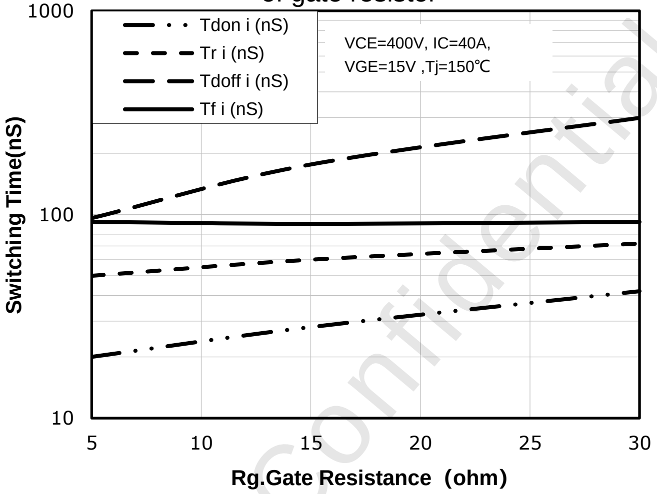


Fig 9: Typical switching energy losses as a function of gate resistor

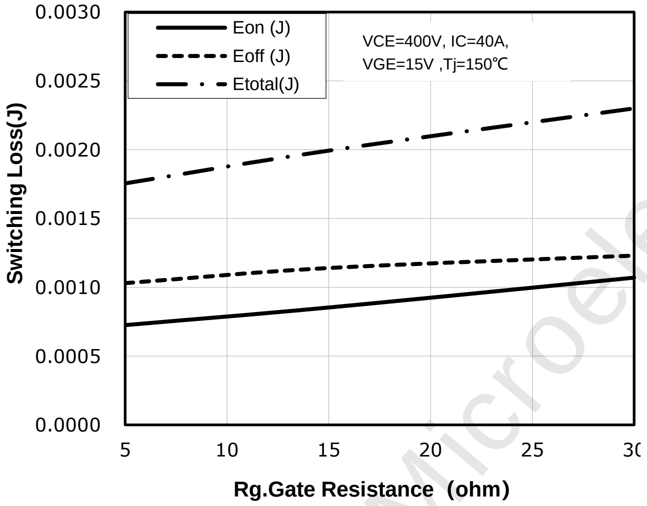


Fig 10: Typical switching energy losses as a function of collector emitter voltage

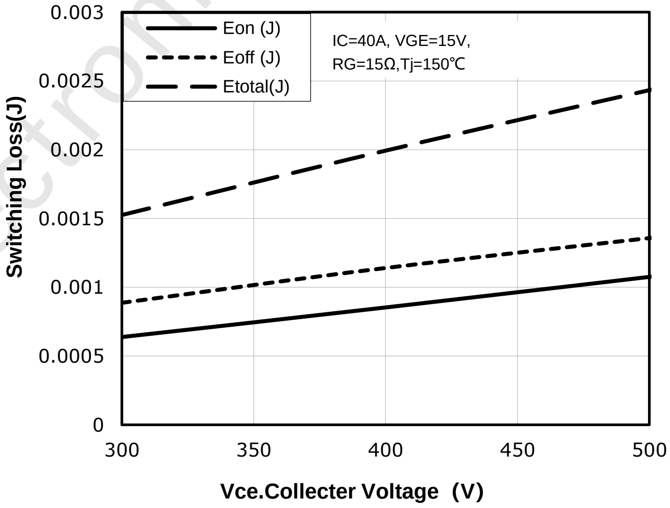


Fig 11: Typical switching times as a function of junction temperature

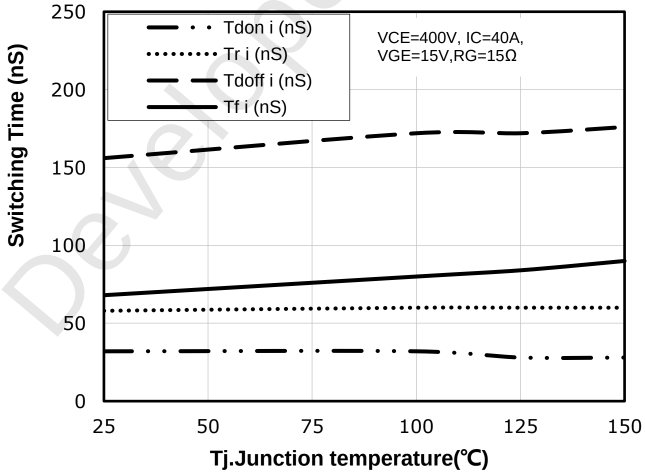


Fig 12: Typical switching energy losses as a function of junction temperature

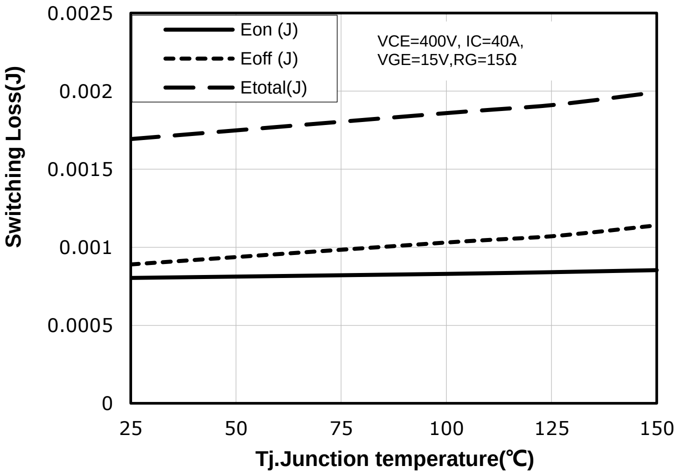
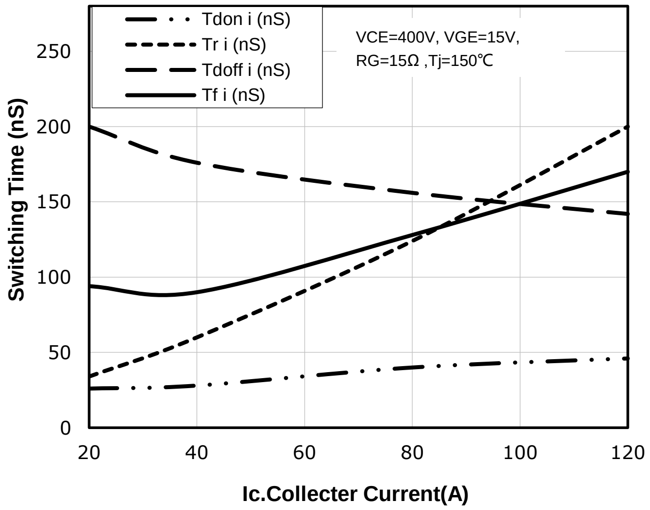
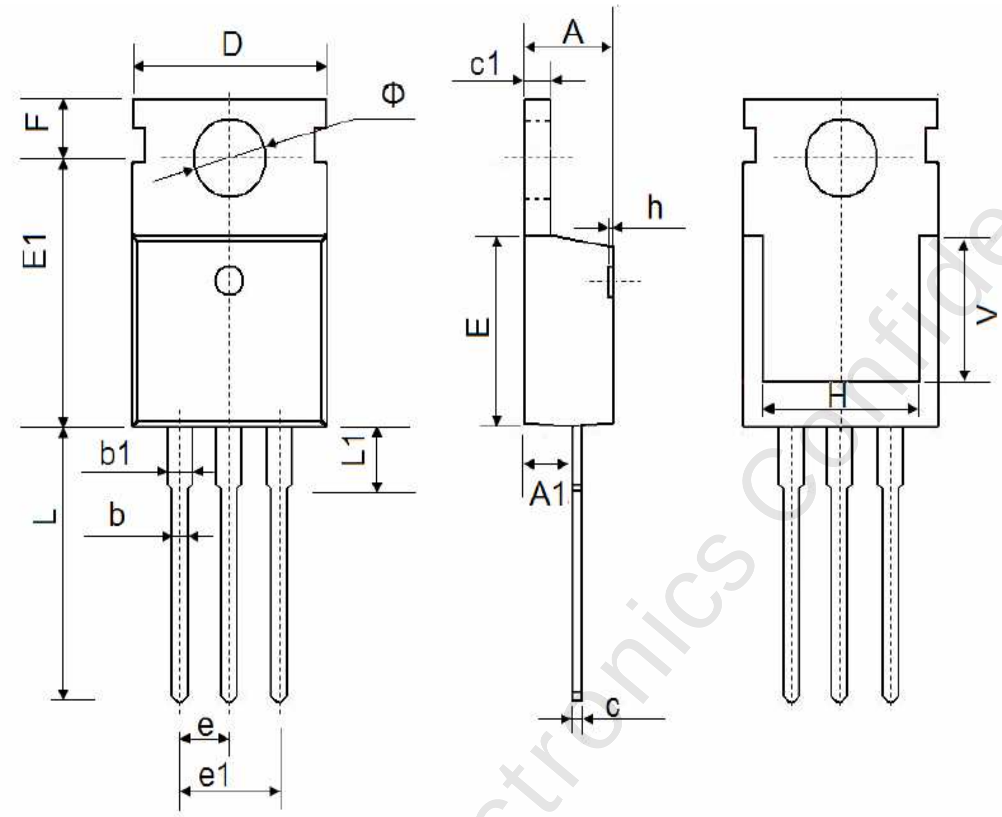


Fig 13: Typical switching times

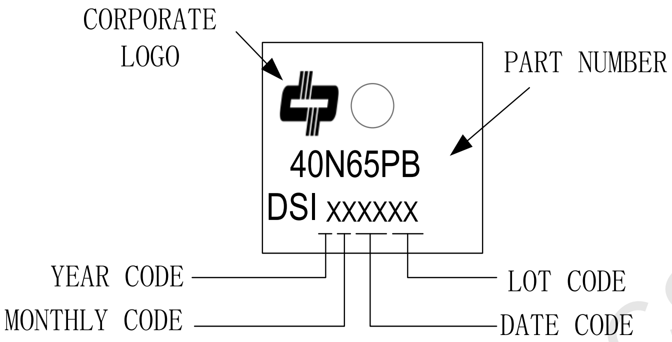


Package Outline: TO-220-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	**Max.**	**Min.**	**Max.**
A	4.30	4.70	0.169	0.185
A1	2.25	2.55	0.089	0.100
b	0.71	0.91	0.028	0.036
b1	1.17	1.37	0.046	0.054
c	0.33	0.65	0.013	0.026
c1	1.20	1.40	0.047	0.055
D	9.91	10.25	0.390	0.404
E	8.95	9.75	0.352	0.384
E1	12.65	12.95	0.498	0.510
e	2.54 BSC.		0.100 BSC.	
e1	4.98	5.18	0.196	0.204
F	2.65	2.95	0.104	0.116
H	7.90	8.10	0.311	0.319
h	0.00	0.30	0.000	0.012
L	12.90	13.40	0.508	0.528
L1	2.85	3.25	0.112	0.128
V	7.500 Ref.		0.295 Ref.	
Φ	3.400	3.800	0.134	0.150

Part Marking Information



Revision History

Revison	Major changes
1.05	Release for initial version1.05

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