

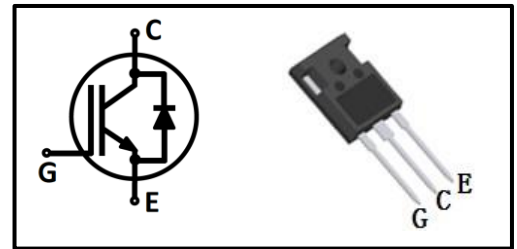
Features

- Easy parallel switching capability due to positive temperature coefficient in V_{CEsat}
- High ruggedness, good thermal stability
- Built in fast recovery diode
- Very tight parameter distribution

Applications

- Welding
- UPS
- PFC

Type	Marking	Package Code
MPBW40N65BH	MP40N65BH	TO-247-3L



Maximum Rated Values ¹

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CE}	650	V
DC collector current ²			A
$T_C=25^\circ\text{C}$	I_C	80	
$T_C=100^\circ\text{C}$		40	
Pulsed collector current ³	I_{Cpuls}	120	
Diode forward current ²			
$T_C=25^\circ\text{C}$	I_F	40	
$T_C=100^\circ\text{C}$		20	
Diode pulsed current ³	I_{Fpuls}	120	
Gate-emitter voltage	V_{GE}	± 20	V
Transient Gate-emitter voltage ($t_p \leq 10\mu\text{s}$)		± 30	
Short circuit withstand time $V_{GE}=15\text{V}, V_{CC}=400\text{V}, T_j \leq 150^\circ\text{C}$	t_{sc}	10	μs
Power dissipation			W
$T_C=25^\circ\text{C}$	P_{tot}	280	
$T_C=100^\circ\text{C}$		112	
Operating junction temperature	T_j	-55~150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55~150	

1: Reference standard: JESD-022 2: limited by T_{jmax} 3: T_p limited by T_{jmax} ;



Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
IGBT thermal resistance, junction-case	R_{thJC}	-	-	0.446	K/W
Diode thermal resistance, junction-case	R_{thJCD}	-	-	1.25	
Thermal Resistance, junction-ambient	R_{thJA}	-	-	40	

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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=0.25mA$	650	-	-	V
Collector-emitter saturation voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A, T_j=25^\circ\text{C}$	-	1.90	2.40	
		$T_j=150^\circ\text{C}$	-	2.40	-	
Diode forward voltage	V_F	$V_{GE}=0V, I_F=20A, T_j=25^\circ\text{C}$	-	1.70	-	
		$T_j=150^\circ\text{C}$	-	1.40	-	
G-E threshold voltage	$V_{GE(th)}$	$I_C=1mA, V_{CE}=V_{GE}$	5.0	5.8	7.0	
C-E leakage current	I_{CES}	$V_{CE}=650V, V_{GE}=0V, T_j=25^\circ\text{C}$	-	-	0.1	mA
		$T_j=150^\circ\text{C}$	-	-	4.0	
G-E leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	250	nA
Transconductance	g_{FS}	$V_{CE}=20V, I_C=40A$	-	24	-	S

Dynamic Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input capacitance	C_{iss}	$V_{CE}=30V, V_{GE}=0V, f=1MHz$	-	3453	-	pF
Output capacitance	C_{oss}		-	141	-	
Reverse transfer capacitance	C_{rss}		-	76	-	
Gate charge	Q_G	$V_{CC}=400V, I_C=40A, V_{GE}=15V$	-	239	-	nC



IGBT Switching Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Turn-on delay time	$t_{d(on)}$	$T_j=25^{\circ}C,$ $V_{CC}=400V,$ $I_C=40A,$ $V_{GE}=0/15V,$ $R_G=10\Omega,$ Inductive load	-	55	-	ns
Rise time	t_r		-	51	-	
Turn-off delay time	$t_{d(off)}$		-	140	-	
Fall time	t_f		-	40	-	
Turn-on energy	E_{on}		-	1.3	-	mJ
Turn-off energy	E_{off}		-	0.6	-	
Total switching energy	E_{ts}		-	1.9	-	
Turn-on delay time	$t_{d(on)}$	$T_j=150^{\circ}C,$ $V_{CC}=400V,$ $I_C=40A,$ $V_{GE}=0/15V,$ $R_G=10\Omega,$ Inductive load	-	53	-	ns
Rise time	t_r		-	51	-	
Turn-off delay time	$t_{d(off)}$		-	152	-	
Fall time	t_f		-	37	-	
Turn-on energy	E_{on}		-	1.60	-	mJ
Turn-off energy	E_{off}		-	0.80	-	
Total switching energy	E_{ts}		-	2.40	-	

Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode reverse recovery time	t_{rr}	$T_j=25^{\circ}C,$ $V_R=400V,$ $I_F=20A,$ $di_F/dt=200A/\mu s$	-	80	-	ns
Diode reverse recovery charge	Q_{rr}		-	0.24	-	μC
Diode peak reverse recovery current	I_{rrm}		-	6.0	-	A

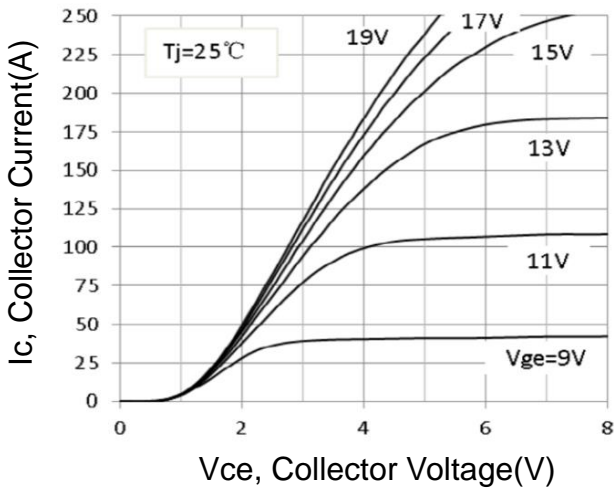


Figure 1. Typical output characteristic ($T_j = 25^\circ \text{C}$)

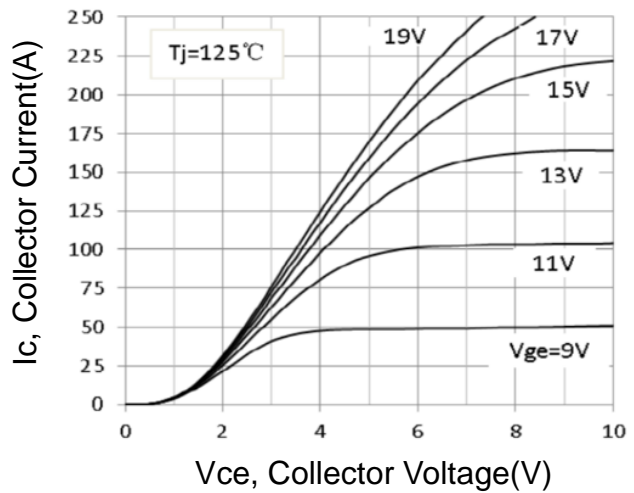


Figure 2. Typical output characteristic ($T_j = 125^\circ \text{C}$)

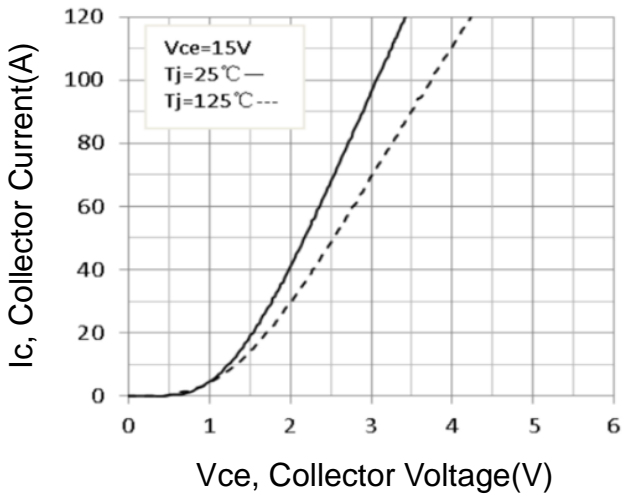


Figure 3. Typical saturation voltage drop characteristic

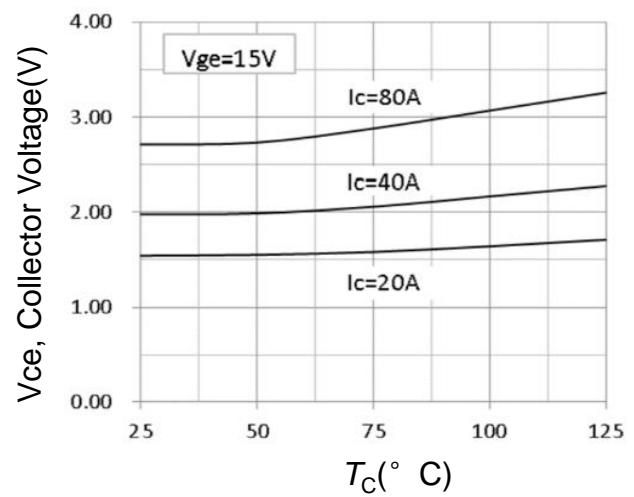


Figure 4. Saturation voltage drop temperature characteristic

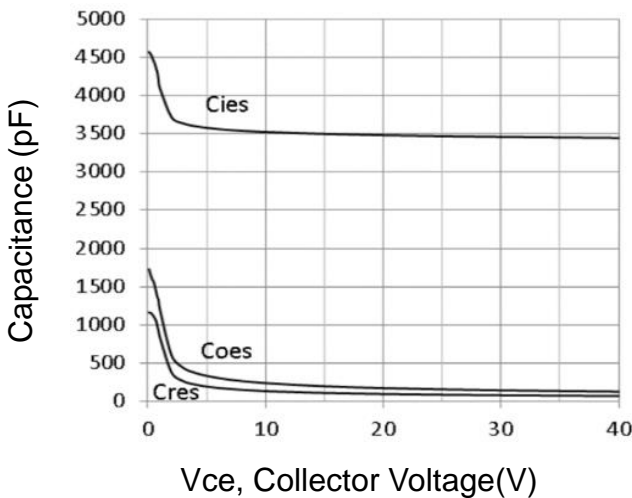


Figure 5. Capacitance characteristic ($V_{GE} = 0\text{V}$, $f = 1\text{MHz}$)

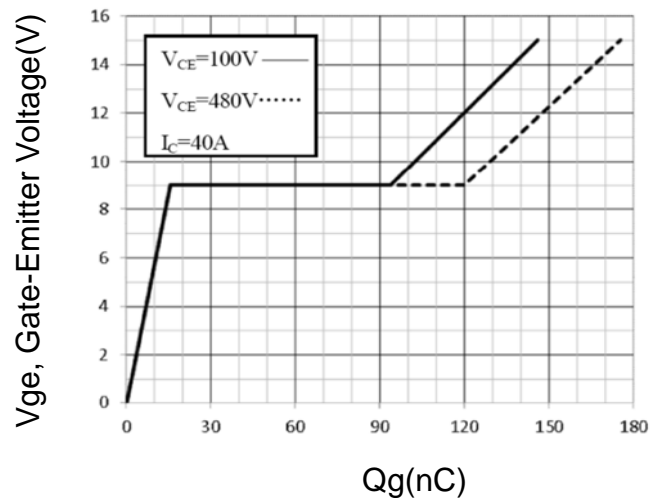


Figure 6. Typical gate charge ($I_C = 40\text{A}$)

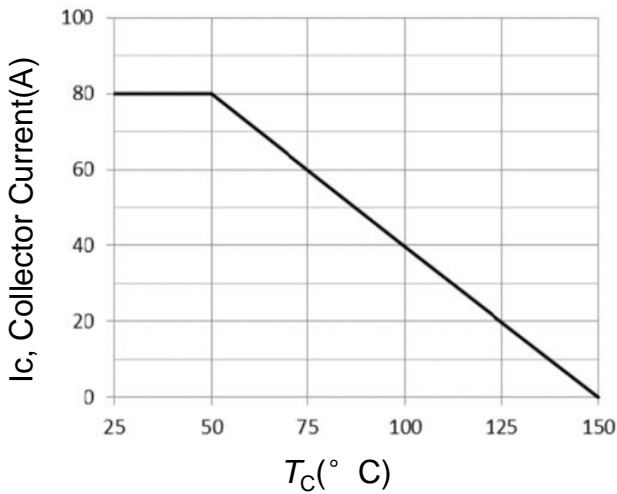


Figure 7. Collector current as a function of case temperature ($V_{GE} \geq 15V$, $T_j \leq 150^\circ C$)

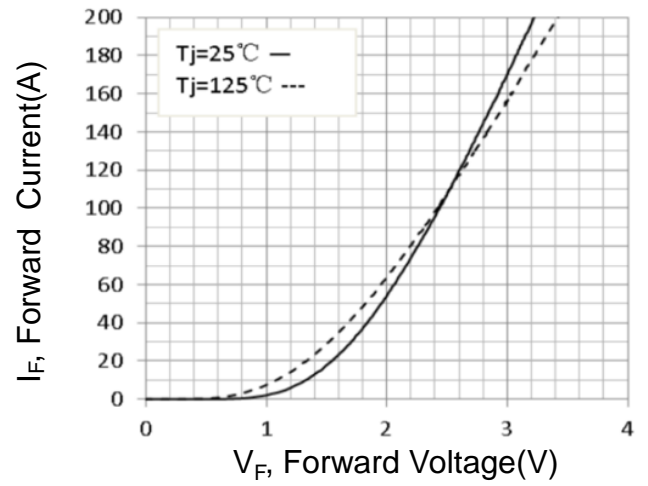


Figure 8. Typical diode forward current as a function of forward voltage

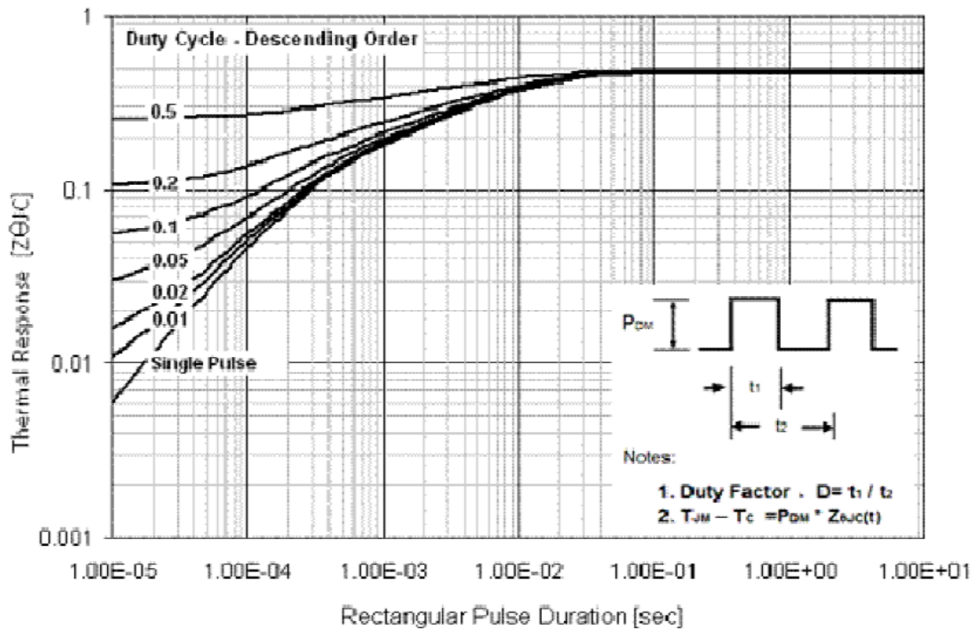
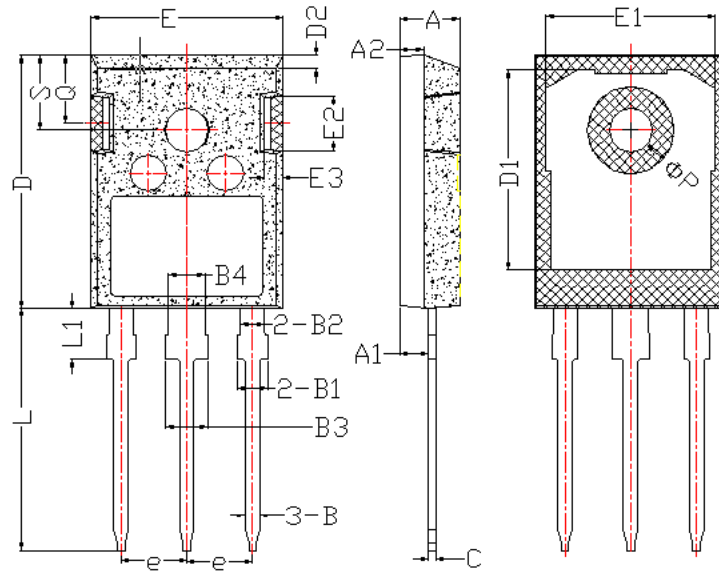


Figure 9. IGBT transient thermal resistance

TO-247



项 目	规范(mm)	
	MIN	MAX
A	4.6	5.2
A1	2.2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.60	21.30
D1	16	18
E	15.5	16.10
E1	13	14.7
E2	3.80	5.3
E3	0.8	2.60
e	5.2	5.7
L	19	20.5
L1	3.9	4.6
ϕP	3.3	3.70
Q	5.2	6.00
S	5.8	6.6



Revision History

Revision	Date	Subjects (major changes since last revision)
1.0	2020-05-21	



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