



MIQ50T065DFS

Silicon Trench FS IGBT

Features

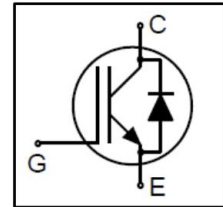
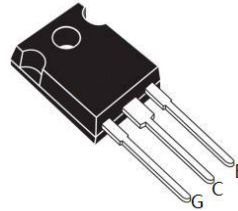
- ◆ Low Switching Losses
- ◆ Positive Temperature Coefficient
- ◆ 650V Trench Gate/Field Stop Process

Product Summary

V_{CES}	650	V
I_C	50	A
$V_{CE(sat),typ}$	1.58	V

Application

- ◆ Inverters
- ◆ Charging Pile
- ◆ On-board Charger
- ◆ Uninterrupted Power Supply



Key Performance and Package Parameters

Type	V_{CE}	I_C	$V_{CE(sat)}, T_{vj} = 25^{\circ}C$	$T_{vj\ max}$	Package
MIQ50T065DFS	650V	50A	1.58V	175°C	TO-247

Maximum Ratings For

Symbol	Parameter	Value	Unit
V_{CES}	Collector-emitter voltage, $T_{vj} = 25^{\circ}C$	650	V
I_C	DC collector current, limited by $T_{vj\ max}$, $T_C = 25^{\circ}C$	100	A
	DC collector current, limited by $T_{vj\ max}$, $T_C = 100^{\circ}C$	50	
I_F	Diode forward current, limited by $T_{vj\ max}$, $T_C = 25^{\circ}C$	100	A
	Diode forward current, limited by $T_{vj\ max}$, $T_C = 100^{\circ}C$	50	
V_{GE}	Gate-emitter voltage	± 20	V
V_{GE}	Transient Gate-emitter voltage	± 30	V
P_{tot}	Power dissipation $T_C = 25^{\circ}C$	275	W
$T_{vj(OP)}$	Operating junction temperature	-40...+175	°C
t_{SC}	Short circuit withstand time $V_{GE} = 15.0V$, $V_{CE} = 400V$	-	μs

Thermal Resistance

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	IGBT thermal resistance, junction - case	-	-	-	0.38	K/W
$R_{\theta JC}$	Diode thermal resistance, junction - case	-	-	-	0.45	K/W

■ **Static Characteristic, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{(BR)CES}$	Collector-emitter breakdown voltage	$V_{GE} = 0V, I_C = 250\mu A$	650	-	-	V
V_{CEsat}	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 50A, T_{vj} = 25^{\circ}\text{C}$	-	1.58	2.1	V
		$V_{GE} = 15V, I_C = 50A, T_{vj} = 125^{\circ}\text{C}$	-	1.87	-	
		$V_{GE} = 15V, I_C = 50A, T_{vj} = 150^{\circ}\text{C}$	-	1.95	-	
V_F	Diode forward voltage	$V_{GE} = 0V, I_C = 50A, T_{vj} = 25^{\circ}\text{C}$	-	1.63	2.1	V
		$V_{GE} = 0V, I_C = 50A, T_{vj} = 125^{\circ}\text{C}$	-	1.42	-	
		$V_{GE} = 0V, I_C = 50A, T_{vj} = 150^{\circ}\text{C}$	-	1.37	-	
$V_{GE(th)}$	Gate-emitter threshold voltage	$V_{CE} = V_{GE}, I_C = 500\mu A$	4.2	5.0	5.8	V
I_{CES}	Zero gate voltage collector current	$V_{CE} = 650V, V_{GE} = 0V$	-	-	1	mA
I_{GES}	Gate-emitter leakage current	$V_{CE} = 0V, V_{GE} = 20V$	-	-	200	nA
g_{fs}	Transconductance	$V_{CE} = 20V, I_C = 50A$	-	77	-	S

■ **Dynamic Characteristics, at $T_{vj} = 25^{\circ}\text{C}$, unless otherwise specified**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, F = 1\text{MHz}$	-	5.46	-	nF
C_{res}	Reverse transfer capacitance		-	0.1	-	
Q_G	Gate charge	$V_{GE} = -15...+15V$	-	0.5	-	μC

■ **IGBT Characteristic, at $T_{vj} = 25^{\circ}\text{C}$**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{CE} = 400V, I_C = 50A, V_{GE} = \pm 15V, R_g = 8\Omega$	-	33	-	ns
t_r	Turn-On Rise Time		-	75	-	
$t_{d(off)}$	Turn-Off Delay Time		-	21	-	
t_f	Turn-Off Fall Time		-	41	-	
E_{on}	Turn-on energy	$I_F = 50A, V_R = 400V, V_{GE} = -15V, di/dt = 411A/\mu s$	-	2.37	-	mJ
E_{off}	Turn-off energy		-	0.60	-	
t_{rr}	Diode reverse recovery time	$I_F = 50A, V_R = 400V, V_{GE} = -15V, di/dt = 411A/\mu s$	-	133	-	ns
Q_{rr}	Diode reverse recovery charge		-	1.48	-	μC

■ Characteristic Curve

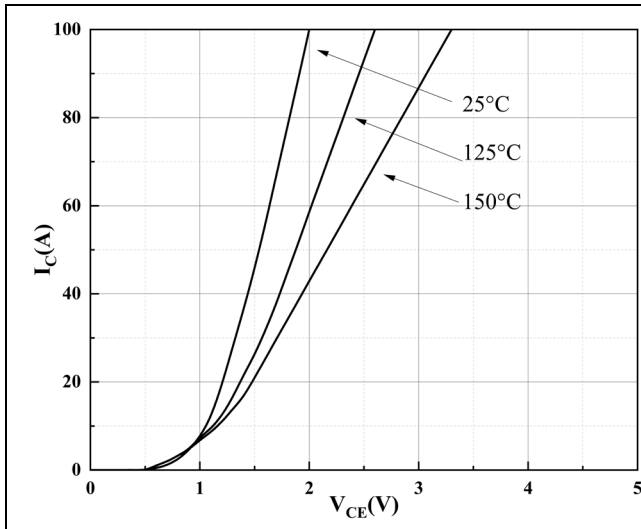


Figure 1. Typical Output Characteristics
 $V_{GE} = 15V$

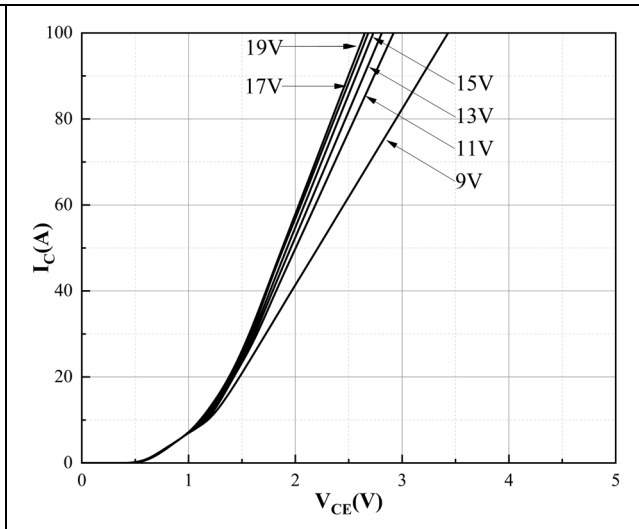


Figure 2. Typical Output Characteristics
 $T_{vj} = 150^{\circ}C$

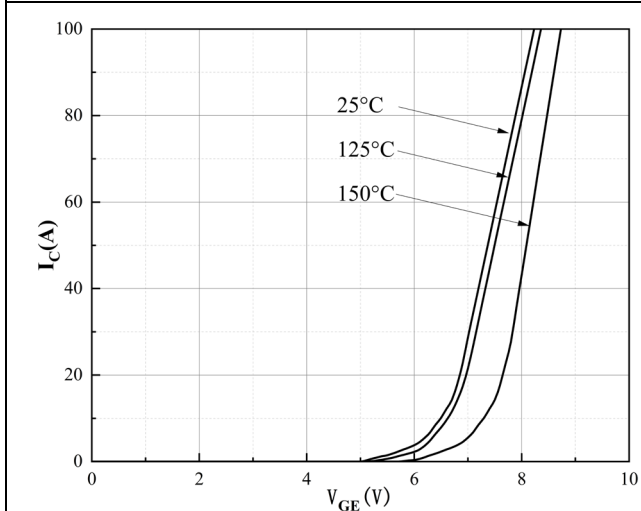


Figure 3. Typical Transfer Characteristic
 $V_{CE} = 20V$

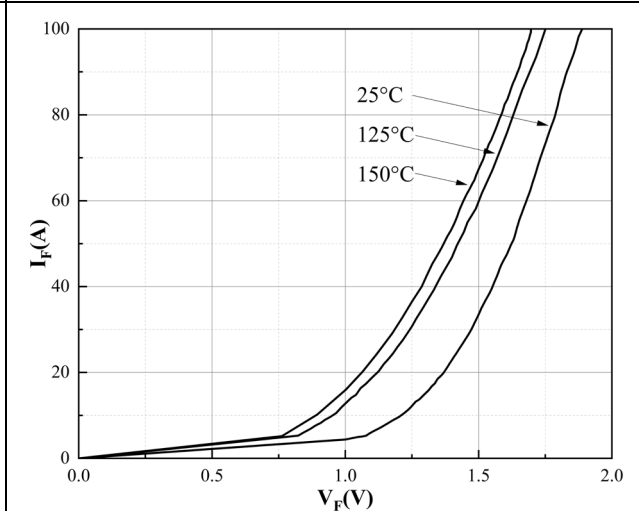


Figure 4. Forward Characteristic Of Diode

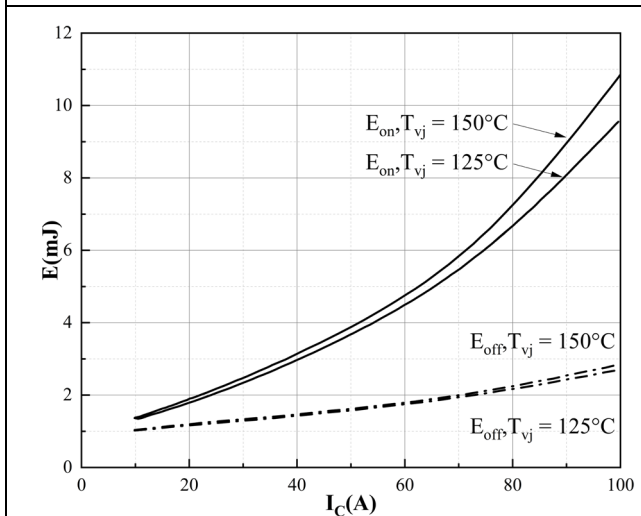


Figure 5. Switching Losses Of IGBT
 $V_{GE} = \pm 15V$, $R_{gon} = 8\Omega$, $R_{goff} = 8\Omega$, $V_{CE} = 400V$

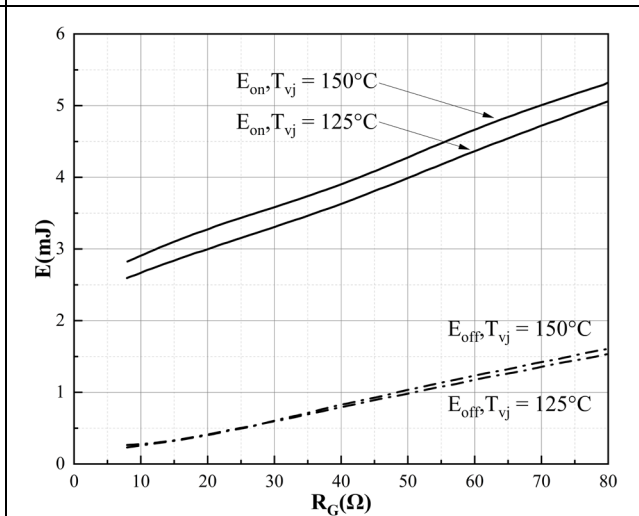


Figure 6. Switching Losses Of IGBT
 $V_{GE} = \pm 15V$, $I_C = 50A$, $V_{CE} = 400V$

■ Characteristic Curve

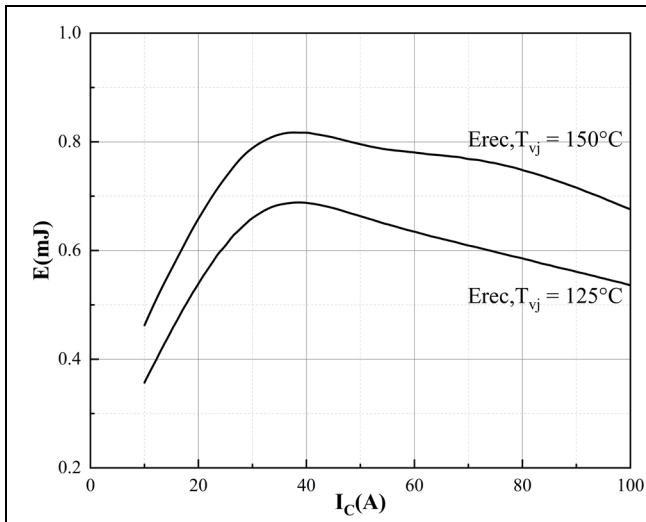


Figure 8. Switching Losses Of Diode
 $R_{gon} = 8\Omega$, $V_{CE} = 400\text{V}$

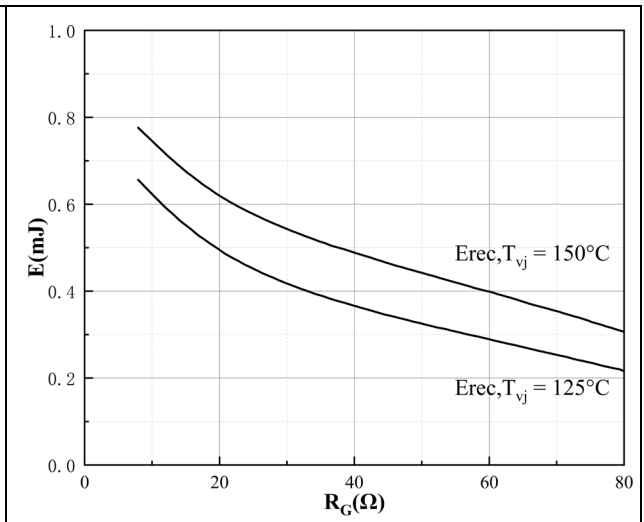


Figure 8. Switching Losses Of Diode
 $I_F = 50\text{A}$, $V_{CE} = 400\text{V}$

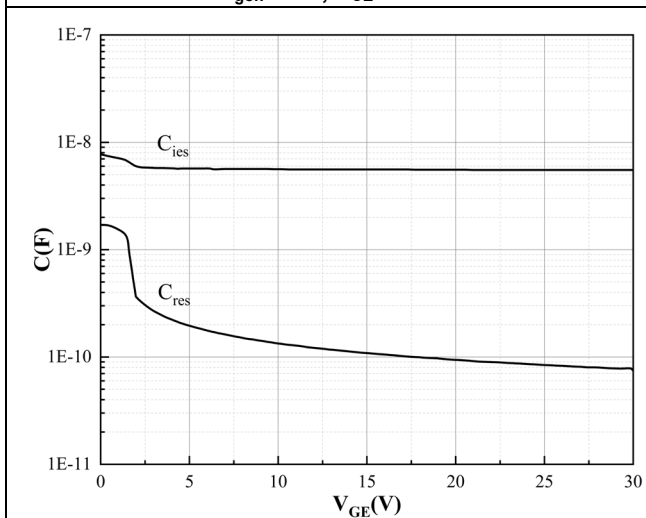
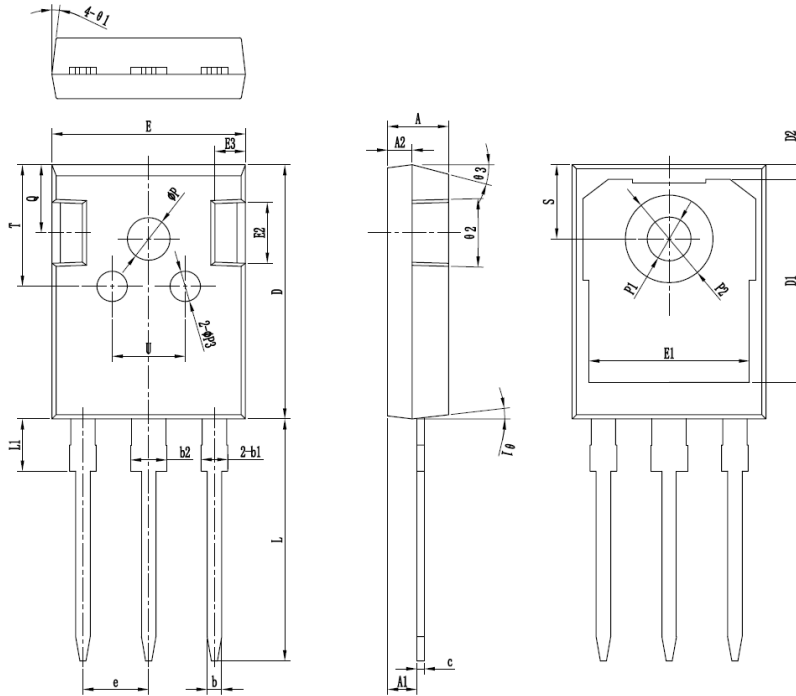


Figure 9. Typical Capacitance

Package Information

TO-247



符号	单位: mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
*E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.92	20.10
*L1	-	-	4.30
*ΦP	3.70	3.80	3.90
*ΦP1	3.50	3.60	3.70
ΦP2	7.00	7.20	7.40
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.26
J	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°