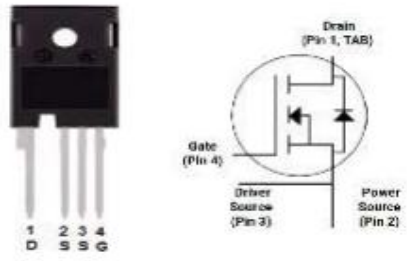
Silicon Carbide Power MOSFET 650V,75A,30mΩ

General Description

Features

- High Blocking Voltage
- High Frequency Operation
- Low on-resistance
- Fast intrinsic diode with low reverse recovery



TO-247-4
Pin definition

Applications

- Motor Drives
- Solar / Wind inverters
- On board EV Charger
- Energy Storage
- Server
- Telecom
- SMPS
- Uninterruptable power supplies

Benefits

- Higher System Efficiency
- Parallel Device Convenience without thermal runaway
- High Temperature Application
- Hard Switching & Higher Reliability
- Easy to drive

Key performance parameters

Type	V_{DS}	I_D T_C=25℃	$R_{DS(ON)}$
TK3M30065K	650V	75A	30mΩ

Maximum Ratings

T_C=25°C, unless otherwise specified

Parameter	Symbol	Test conditions	Value	Unit
Drain - Source Voltage	V_{DSmax}	V_{GS} = 0V, I_D = 100μA	650	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC (f>1 Hz)	-10/+25	V
Gate - Source Voltage (static)	V_{GSop}	static	-5/+20	V

Maximum Ratings

T_C=25°C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous Drain Current: V_{GS} = 20V T_C = 25°C T_C = 100°C	I_D	75 54	A
Pulsed Drain Current: T_C = 25°C	$I_{D(pulse)}$	170	A
Short Circuit Capability : V_{DD} = 400V V_{GS} = 20V	t_{sc}	TBD	μS
Short Circuit Capability : V_{DD} = 400V V_{GS} = 20V	I_{DS}	TBD	A
Total power dissipation : T_C = 25°C	P_D	300	W
Operating Junction Temperature :	T_j	-55 to 175	°C
Storage Temperature :	T_{stg}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Condition	Typ	Max	Unit
Thermal Resistance (per device)	$R_{th(j-c)}$	junction-case	0.35	0.5	°C/W

Electrical Characteristic

T_C =25°C, unless otherwise specified

Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	650			V	V_{GS} = 0V ， I_D = 100μA
Gate Threshold Voltage	$V_{GS(th)}$	2.0	2.6 2.1 2.0	4.0	V	V_{DS} = V_{GS}, I_D = 10mA T_J = 150°C T_J = 175°C
Zero Gate Voltage Drain Current	I_{DSS}	0	5	100	μA	V_{DS} = 650V， V_{GS} = 0V
Gate-Source Leakage Current	I_{GSS}	0 -200	10 -10	200 0	nA	V_{GS} = 20V， V_{DS} = 0V V_{GS} = -5V， V_{DS} = 0V
Drain-Source On-State Resistance	$R_{DS(on)}$		30 42 45	40	mΩ	V_{GS} = 20V， I_D = 40 A T_J = 150°C T_J = 175°C
Transconductance	g_{fs}		18 TBD TBD		S	V_{GS} = 20V， I_D = 40 A T_J = 150°C T_J = 175°C
Input capacitance	C_{iss}		2000		pF	V_{DS} = 400V V_{GS} = 0V f = 1MHz
Output capacitance	C_{iss}		270			
Reverse transfer capacitance	C_{rss}		23			
Coss Stored Energy	E_{oss}		TBD		μJ	
Total gate charge	Q_g		TBD		nC	V_{DS} = 400V V_{GS} = -5V / 20V I_D = 40 A
Gate-source charge	Q_{gs}		TBD			
Gate-drain charge	Qgd		TBD			
Internal gate input resistance	$R_{g(int)}$		3		Ω	f = 1MHz I_D = 0A
Turn-On Switching Energy	E_{ON}		TBD		μJ	V_{DS}= 400V V_{GS} = -5V/20V I_D = 40A $R_{G(ext)}$ =1.5 Ω L = 450μH
Turn-Off Switching Energy	E_{OFF}		TBD			
Turn-On Delay Time	$t_{d(on)}$		TBD		ns	V_{DS} = 800V V_{GS} = -5V/20V
Rise Time	t_r		TBD			

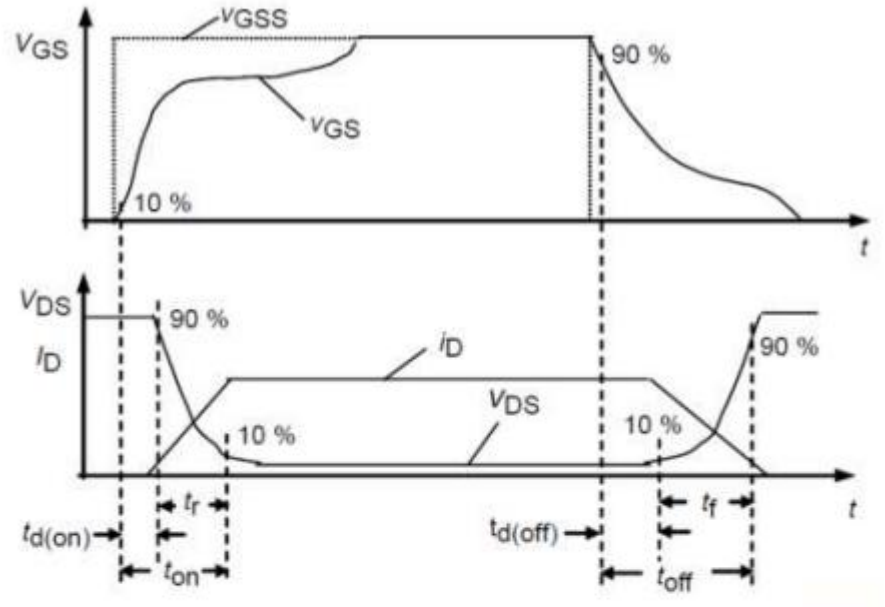
Turn-Off Delay Time	$t_{d(off)}$		TBD			I_D = 40A $R_{G(ext)}$ =1.5 Ω L = 450μH
Fall Time	t_f		TBD			
Avalanche Capability	E_{AS}		TBD		mJ	V_{DD} = 100V V_{GS} = 20V L=1mH
	I_{Av}		TBD		A	

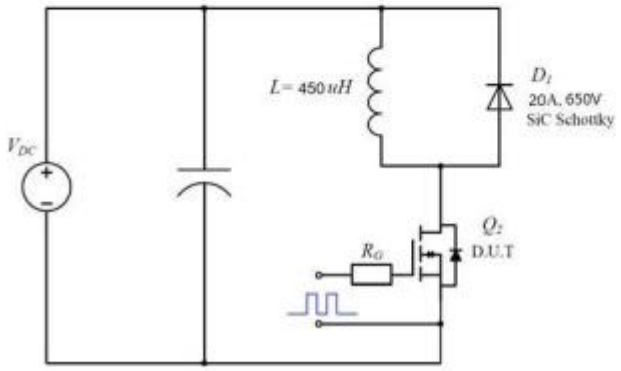
Reverse Diode Characteristics

T_C =25°C, unless otherwise specified

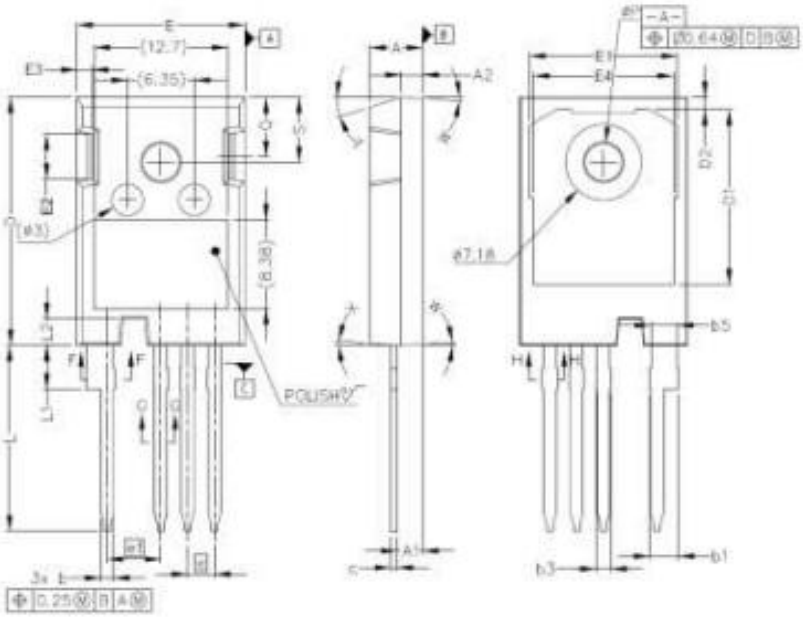
Parameter	Symbol	Value			Unit	Test Condition
		Min.	Typ.	Max.		
Diode Forward Voltage	V_{SD}		4.0 3.5 3.3		V	V_{GS} = -5V I_{SD} = 10A T_J = 150°C T_J = 175°C
Continuous Diode Forward Current	I_S		50		A	V_{GS} = -5V
Reverse Recovery time	t_{rr}		TBD		ns	V_{GS} = -5V I_{SD} = 20A V_R = 400V dif/dt = 2600 A/μs
Reverse Recovery Charge	Q_{rr}		TBD		nC	
Peak Reverse Recovery Current	I_{rrm}		TBD		A	

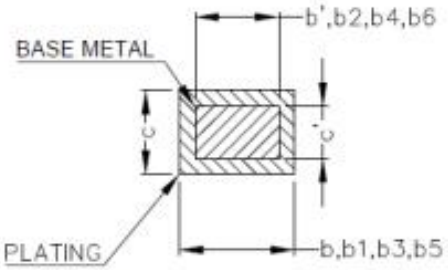
Switching Times Definition and Test Circuit





Package Outline:TO-247-4





SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

SYMBOL	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5 ° REF.	
X	4° REF.	