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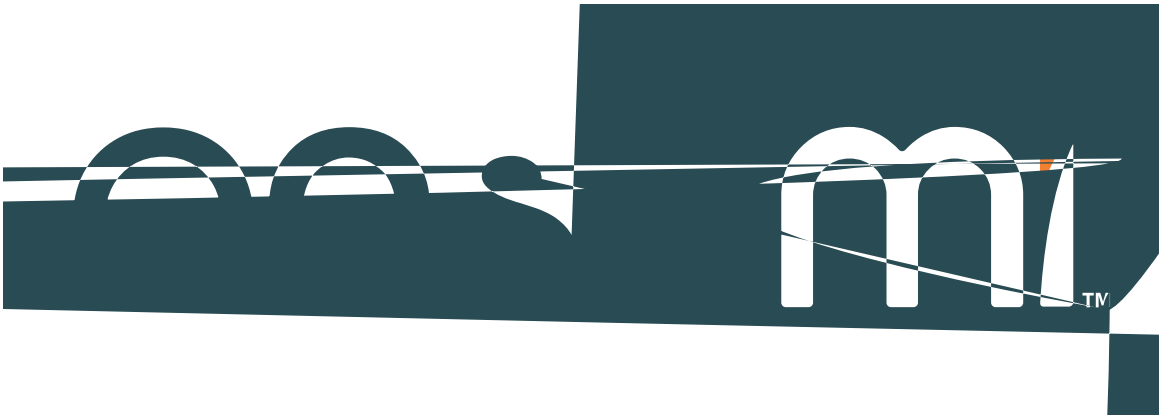

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Maximum Ratings

Symbol	Value	Units
V_{DS}	650	V
V_{GS}	-25 to +25	V
	54	A
	40	A
I_{DM}	125	A
E_{AS}	76	

Electrical Characteristics (T_J

Typical Performance - Dynamic

			Min	Typ	Max	
	C_{iss}			1500		
	C_{oss}			200		
	C_{rss}			2.2		
	$C_{oss(er)}$			146		pF
Effective output capacitance, time related	$C_{oss(tr)}$	V_{DS}=0V to 400V, V_{GS}=0V		325		pF
C_{OSS}	E_{oss}			11.7		µJ
Total gate charge	Q_G	V_{DS}=400V, I_D=40A, V_{GS} = -5V to15V		51		nC
Gate-drain charge	Q_{GD}			11		
Gate-source charge	Q_{GS}			19		
	$t_{d(on)}$			35		
	t_r			24		
	$t_{d(off)}$			57		
	t_f			14		
	E_{ON}			500		
	E_{OFF}			118		
Total switching energy including R_S energy[4]	E_{TOTAL}			618		
Snubber R_S energy during turn-on	E_{RS_ON}			1.7		
Snubber R_S energy during turn-off	E_{RS_OFF}			4.5		
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V, I_D=40A, Gate Driver =-5V to +15V, Turn-on $R_{G,EXT}$=1.8 : , Turn-off $R_{G,EXT}$=22 : Inductive Load, FWD: same device with V_{GS} = -5V and R_S = 22 : , RC snubber: R_S=5 : and C_S=150pF, T_J=150°C		35		ns
Rise time	t_r			22		
Turn-off delay time	$t_{d(off)}$			60		
Fall time	t_f			13		
Turn-on energy including R_S energy[4]	E_{ON}			479		µJ
Turn-off energy including R_S energy[4]	E_{OFF}			124		
Total switching energy including R_S energy[4]	E_{TOTAL}			603		
Snubber R_S energy during turn-on	E_{RS_ON}			1.8		
Snubber R_S energy during turn-off	E_{RS_OFF}			5.3		

4. The switching performance are evaluated with a RC snubber circuit as shown in Figure 24.

Related Devices

Spice Models

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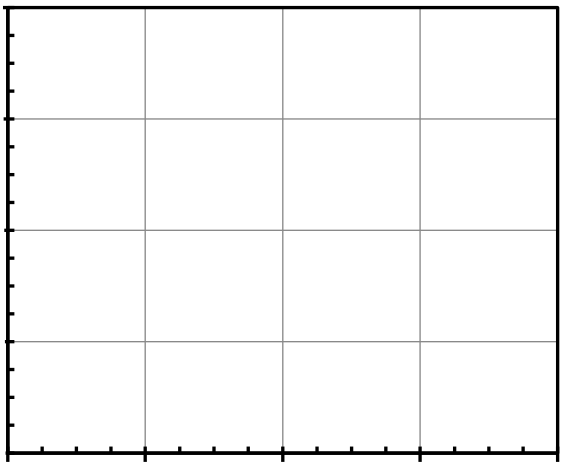

9. 3rd quadrant characteristics at T_j = -55°C

Figure 10. 3rd quadrant characteristics at T_j = 25°C

11. 3rd quadrant characteristics at T_j = 175°C

Figure 12. Typical stored energy in C_{OSS} at V_{GS} = 0V

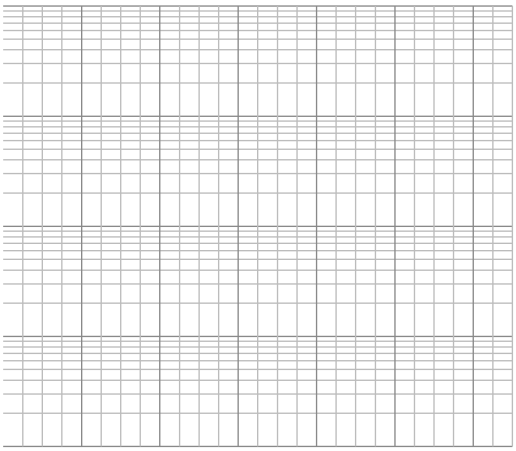

Figure 13. Typical capacitances at f = 100kHz and V_{GS} = 0V

Figure 14. DC drain current derating

Figure 15. Total power dissipation

Figure 16. Maximum transient thermal impedance

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(a)

(b)

(a)

(b)

(a) (b)

Figure 22. Clamped inductive switching energy including RC snubber energy loss (a) and RC snubber energy l

(a) (b)

Figure 24. Clamped inductive load switching test circuit
An RC snubber (R_S = 5 : and C_S = 150pF) is required to improve the turn-off waveforms.

Applications Information

SiC FETs are enhancement-mode power switches formed by a high-voltage SiC depletion-mode JFET and a low-voltage silicon MOSFET connected in series. The silicon MOSFET serves as the control unit while the SiC JFET provides high voltage blocking in the off state. This combination of devices in a single package provides compatibility with standard gate drivers and offers superior performance in terms of low on-resistance ($R_{DS(on)}$), output capacitance (C_{oss}

Like other high performance power switches, proper PCB layout design to minimize circuit parasitics is strongly recommended due to the high dv/dt and di/dt rates. An external gate resistor is recommended when the FET is working in the diode mode in order to achieve the optimum reverse recovery performance. For more information on SiC FET operation, see www.unitedsic.com.

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PART MARKING

PACKING TYPE

ANTI-STATIC TUBE

QUANTITY /TUBE : 50 UNITS

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