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650 V, 11 A, 380 m Ω

Description

The 650V E series has excellent low on-resistance and gate charge by utilizing charge balance technology . This technology combines the benefits of an excellent switching performance with ease of usage and robustness. Consequently, the 650V E series is suitable for application requiring superior efficiency and extra safety margin for design with higher voltage.

Features

BV _{DSS} @ T _{J,max}	I _D	R _{DS(on),max}	Q _{g,typ}
700 V	11 A	380 mΩ	16.5 nC

- Reduced Switching & Conduction Losses
- Lower Switching Noise
- 100% Avalanche Tested
- Pb-free and RoHS Compliant
- Compliance with EU REACH



Applications

- PFC, Hard & Soft Switching Topologies
- Industrial & Consumer Power Supplies





Absolute Maximum Ratings ($T_c = 25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Value	Unit		
V _{DSS}	Drain to Source Voltage	650	V		
V _{GSS}	Gate to Source Voltage	±30	V		
I _D	Drain Current	Continuous (T _C = 25°C)	11*	A	
		Continuous (T _C = 100°C)	7*		
I _{DM}	Drain Current	Pulsed (Note1) 28.8*	А	
E _{AS}	Single Pulsed Avalanche Energy (Note2)) 40	mJ	
I _{AS}	Avalanche Current (Note2)) 2.5	А	
E _{AR}	Repetitive Avalanche Energy (Note1)		0.87	mJ	
dv/dt	MOSFET dv/dt	100	V/ns		
	Peak Diode Recovery dv/dt (Note3)) 20
P _D	Power Dissipation	(T _c = 25°C)	69	W	
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to 150	°C		
TL	Maximum Lead Temperature for Soldering 1/8" from Case for 10 Seconds	260	°C		

*Drain current limited by maximum junction temperature

Thermal Characteristics

Symbol	Parameter	Value	Unit	
R _{eJC}	Thermal Resistance, Junction to Case, Max.	1.8		
R _{eJA}	Thermal Resistance, Junction to Ambient, Max.	62.5	C/W	



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Package Marking and Ordering Information

	. v							
Part Number Top		Top Marking	Package	Packing Method		k	Quantity	
HXMH65M380ES H65M380ES		TO-252-2L	Reel			3000 pcs		
Electric	cal Characte	e ristics (T _c = 25℃ ur	less otherwise noted)					
Symbol		Parameter	Test Conditio	ons	Min	Тур	Max	Unit
Off Chara	cteristics					1	1	
BV _{DSS} Drain to Source		V _{GS} = 0 V, I _D = 1 mA		650				
	Drain to Sourc	e Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA, T _J = 150°C		700			
			V _{DS} = 650 V, V _{GS} = 0 V	V _{DS} = 650 V, V _{GS} = 0 V			1	
I _{DSS} Zero Ga	Zero Gate Volt	age Drain Current	V _{DS} = 520 V, V _{GS} = 0 V, T _J = 125℃			2	2 µA	μΑ
I _{GSS}	Gate-Source Leakage Current		V _{GS} = ±30 V, V _{DS} = 0 V				±100	nA
On Chara	cteristics		1					
V _{GS(th)}	Gate Threshol	d Voltage	$V_{GS} = V_{DS}, I_{D} = 0.8 \text{ mA}$		2.5		4.5	V
R _{DS(on)}	Static Drain to	Source On Resistance	V _{GS} = 10 V, I _D = 4 A			318	380	mΩ
Dynamic	Characteristics	;						
C _{iss}	Input Capacita	nce	V _{DS} = 400 V, V _{GS} = 0 V, f = 250 kHz			624		pF
C _{oss}	Output Capaci	tance				17		pF
C _{o(tr)}	Time Related	Output Capacitance	$\frac{e}{hce} V_{DS} = 0 V \text{ to } 400 V, V_{GS} = 0 V$			224		pF
C _{o(er)}	Energy Relate	d Output Capacitance				28		pF
Q _{g(tot)}	Total Gate Cha	Fotal Gate Charge at 10 V			16.5		nC	
Q _{gs}	Gate to Source Charge		$V_{DS} = 400 \text{ V}, \text{ I}_{D} = 4 \text{ A},$ $V_{DS} = 10 \text{ V}$			3.4		nC
Q _{gd}	Gate to Drain '	'Miller" Charge	V _{GS} = 10 V			8.2		nC
R _G	Gate Resistan	се	f = 1 MHz			6.9		Ω
Switching	g Characteristic	S						
t _{d(on)}	Turn-On Delay	Time				9		ns
t _r	Turn-On Rise	Time	$V_{DS} = 400 \text{ V}, \text{ I}_{D} = 4 \text{ A},$			9		ns
t _{d(off)}	Turn-Off Delay	Time	$\neg v_{GS} = 10 \text{ V}, \text{ R}_{G} = 10 \Omega$ See Figure 13	V_{GS} = 10 V, R_{G} = 10 Ω See Figure 13		39		ns
t _f	Turn-Off Fall T	ïme				10		ns
Source-D	rain Diode Cha	racteristics						
۱ _s	Maximum Continuous Diode Forward Current					9.6	A	
I _{SM}	Maximum Pulsed Diode Forward Current		nt				28.8	A
V _{SD}	Diode Forward	Voltage	$V_{GS} = 0 V, I_{SD} = 4 A$				1.2	V
t _{rr}	Reverse Reco	very Time	$V_{DD} = 400 \text{ V}, \text{ I}_{SD} = 4 \text{ A}, \text{ d}_{\text{F}}/\text{dt} = 100 \text{ A}/\mu\text{s}$			220		ns
Q _{rr}	Reverse Reco	very Charge				1.78		μC

XNotes:

1. Repetitive rating: pulse-width limited by maximum junction temperature.

2. $I_{AS} = 2.5 \text{ A}, R_G = 25 \Omega$, starting $T_J = 25^{\circ}\text{C}$. 3. $I_{SD} \le 4 \text{ A}$, di/dt $\le 100 \text{ A}/\mu\text{s}, V_{DD} \le 400 \text{ V}$, starting $T_J = 25^{\circ}\text{C}$.



HXMH65M380ES N-Channel Power MOSFET





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Test Circuits





Figure 15. Peak Diode Recovery dv/dt Test Circuit and Waveforms









Package Outline Dimensions



Suggested Solder Pad Layout







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