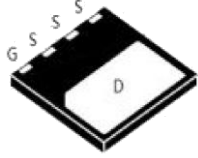
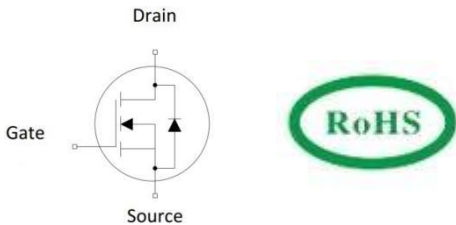


N-channel 650V, 15A, 0.28Ω Super-Junction Power MOSFET

<p>Description</p> <p>Super-junction power MOSFET is a revolutionary technology for high voltage power MOSFET , designed according to the SJ principle. The resulting device has extremely low on resistance,making it especially suitable for applications which require superior power density and outstanding efficiency.</p> <p>Features</p> <ul style="list-style-type: none"> ◆ Very low FOM $R_{DS(on)} \times Q_g$ ◆ 100% UIS tested ◆ RoHS compliant <p>Applications</p> <ul style="list-style-type: none"> ◆ Power factor correction (PFC). ◆ Switched mode power supplies (SMPS). ◆ Uninterrupted power supply (UPS). 	<p>Product Summary</p> <table> <tr> <td>$V_{DS} @ T_{j,25^\circ C}$</td><td>650V</td></tr> <tr> <td>$R_{DS(on),max}$</td><td>0.28Ω</td></tr> <tr> <td>I_D</td><td>15A</td></tr> <tr> <td>$Q_{g,typ}$</td><td>26nC</td></tr> </table> <div style="text-align: center;">  <p>DFN8*8</p> </div> <div style="text-align: center;">  <p>N-Channel MOSFET</p> </div>	$V_{DS} @ T_{j,25^\circ C}$	650V	$R_{DS(on),max}$	0.28Ω	I_D	15A	$Q_{g,typ}$	26nC
$V_{DS} @ T_{j,25^\circ C}$	650V								
$R_{DS(on),max}$	0.28Ω								
I_D	15A								
$Q_{g,typ}$	26nC								

Marking information

Product	Package	Marking	Packing method
HMS13N65D8	DFN8*8	HMS13N65D8	Reel

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	650	V
Continuous drain current ($T_C = 25^\circ C$)	I_D	15	A
($T_C = 100^\circ C$)		9	A
Pulsed drain current ¹⁾	I_{DM}	45	A
Gate-Source voltage	V_{GSS}	± 30	V
Avalanche energy, single pulse ²⁾	E_{AS}	320	mJ
Avalanche current, repetitive ³⁾	I_{AR}	2.2	A
Power Dissipation DFN8*8 ($T_C = 25^\circ C$)	P_D	96	W
- Derate above $25^\circ C$		0.8	W/°C
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C
Continuous diode forward current	I_S	35	A
Diode pulse current	$I_{S,pulse}$	45	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
		DFN8*8	
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.32	$^{\circ}\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	45	$^{\circ}\text{C/W}$
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	T_{sold}	260	$^{\circ}\text{C}$

Electrical Characteristics $T_c = 25^{\circ}\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV _{DSS}	V _{GS} =0 V, I _D =250uA	650	-	-	V
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250uA	2.5		4.0	V
Drain cut-off current	I _{DSS}	V _{DS} =650 V, V _{GS} =0 V, T _j = 25°C T _j = 125°C	- -	- 10	1	μA
Gate leakage current, Forward	I _{GSSF}	V _{GS} =30 V, V _{DS} =0 V	-	-	100	nA
Gate leakage current, Reverse	I _{GSSR}	V _{GS} =-30 V, V _{DS} =0 V	-	-	-100	nA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} =10 V, I _D =5.5 A T _j = 25°C T _j = 150°C	- - -	 0.24 0.62	0.28	Ω
Dynamic characteristics						
Input capacitance	C _{iss}	V _{DS} = 100 V, V _{GS} = 0 V, f = 1MHz	-	1126	-	pF
Output capacitance	C _{oss}		-	41	-	
Reverse transfer capacitance	C _{rss}		-	2.4	-	
Turn-on delay time	t _{d(on)}	V _{DD} = 400V, I _D =7.5A R _G = 25Ω, V _{GS} =10V	-	20	-	ns
Rise time	t _r		-	40	-	
Turn-off delay time	t _{d(off)}		-	95	-	
Fall time	t _f		-	43	-	
Gate charge characteristics						
Gate to source charge	Q _{gs}	V _{DD} =520 V, I _D =5.5A, V _{GS} =0 to 10 V	-	3.6	-	nC
Gate to drain charge	Q _{gd}		-	10.5	-	
Gate charge total	Q _g		-	26	-	
Gate plateau voltage	V _{plateau}		-	5.5	-	V
Reverse diode characteristics						
Diode forward voltage	V _{SD}	V _{GS} =0 V, I _F =7.5A	-	0.85	-	V
Reverse recovery time	t _{rr}	V _R =400 V, I _F =7.5A, dI _F /dt=100 A/μs	-	405	-	ns
Reverse recovery charge	Q _{rr}		-	4	-	μC
Peak reverse recovery current	I _{rrm}		-	21	-	A

Notes:

- Limited by maximum junction temperature, maximum duty cycle is 0.75.
- $I_{AS} = 4\text{ A}, V_{DD} = 50\text{ V},$ Starting $T_j = 25^{\circ}\text{C}.$

Electrical Characteristics Diagrams

Figure 1. Output Characteristics

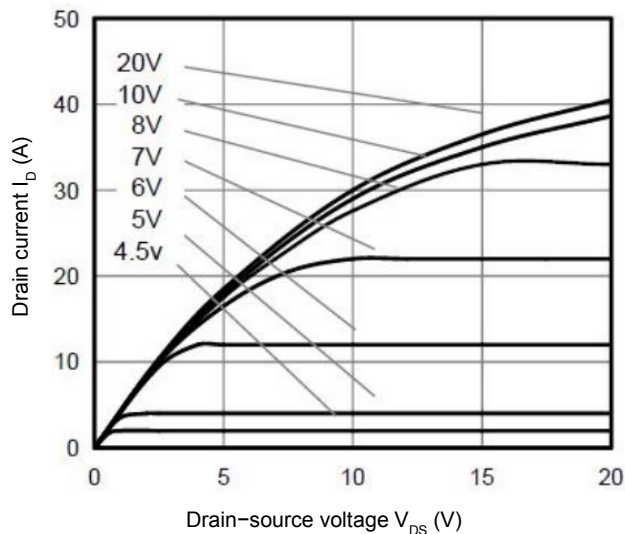


Figure 2. Transfer Characteristics

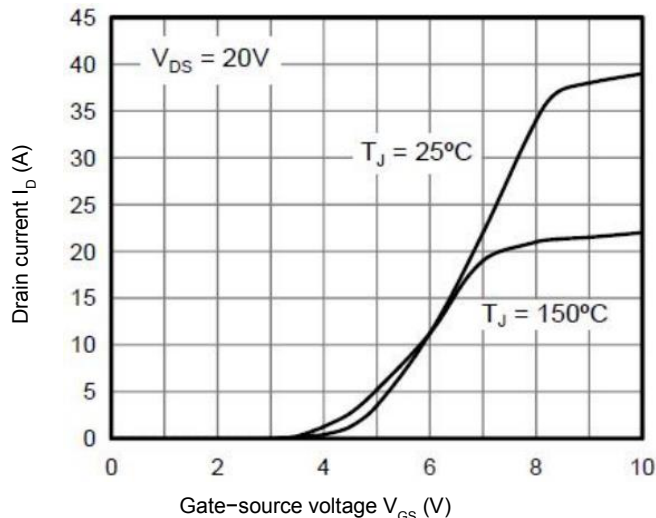


Figure 3. On-Resistance vs. Drain Current

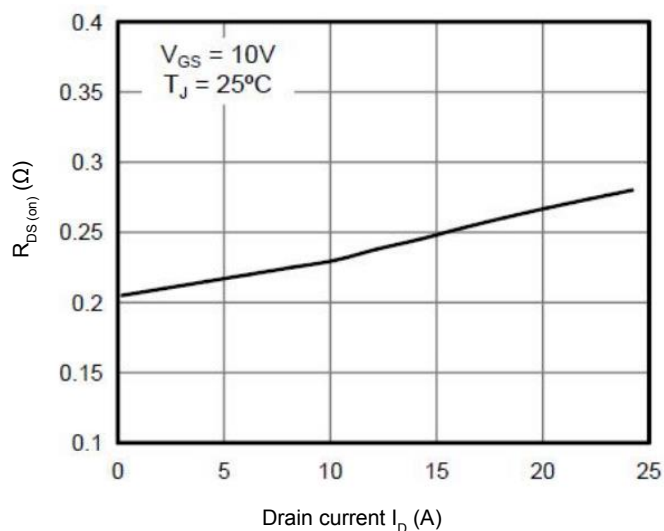


Figure 4. Capacitance Characteristics

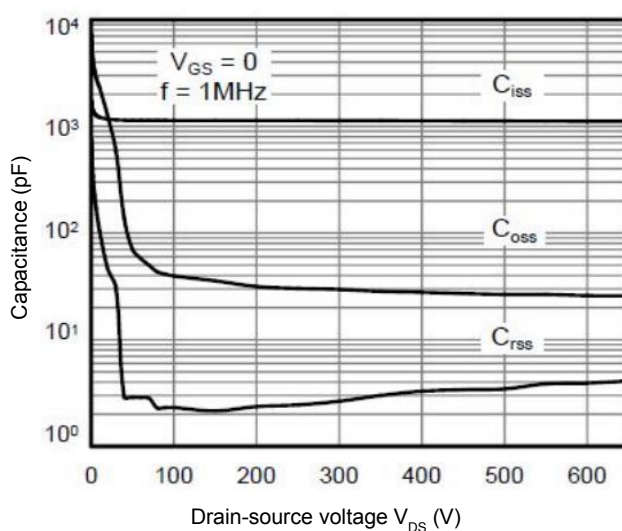


Figure 5. Gate Charge Characteristics

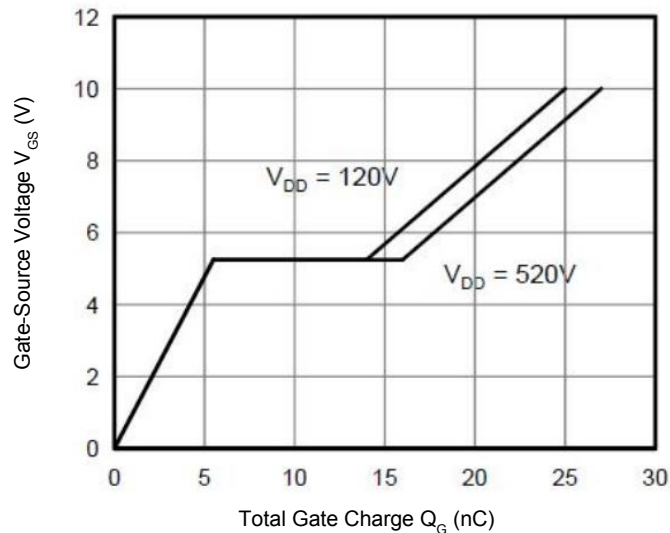


Figure 6. Body Diode Forward Voltage

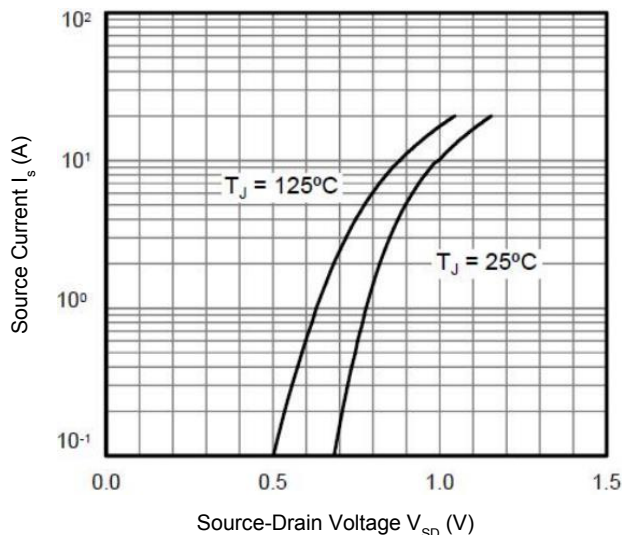


Figure 7. Breakdown Voltage vs. Temperature

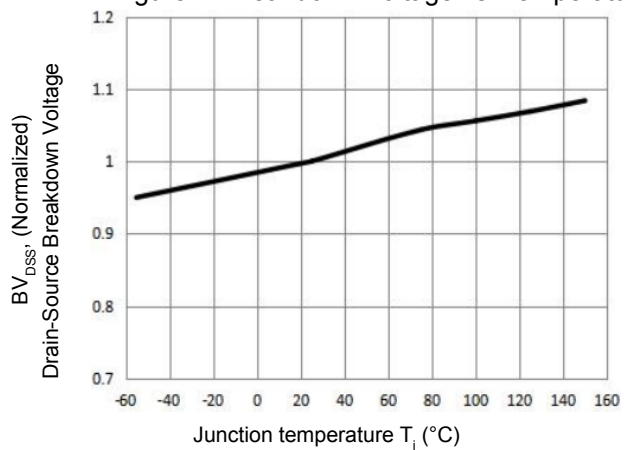


Figure 8. On-Resistance vs. Temperature

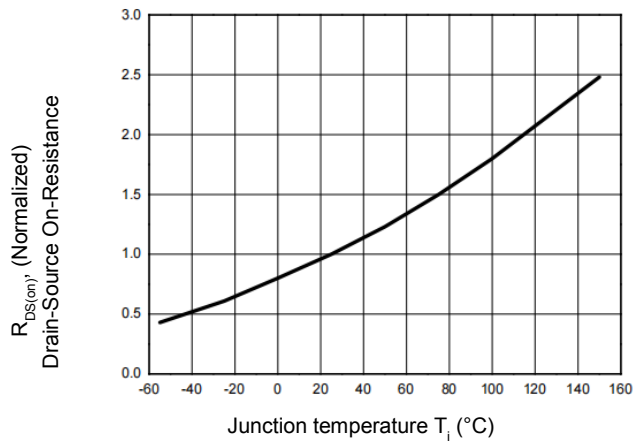
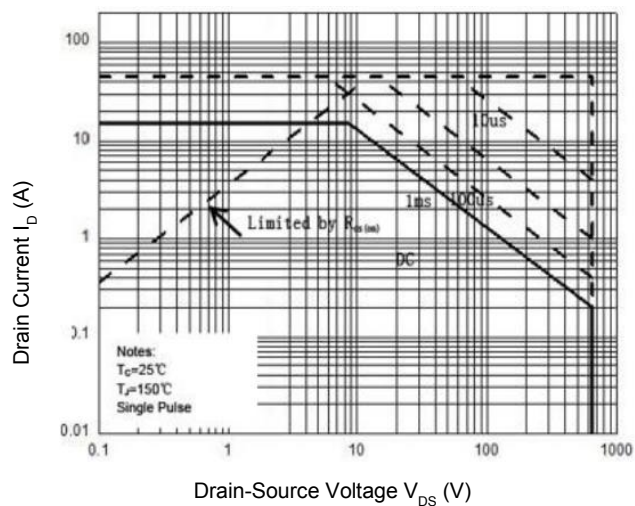
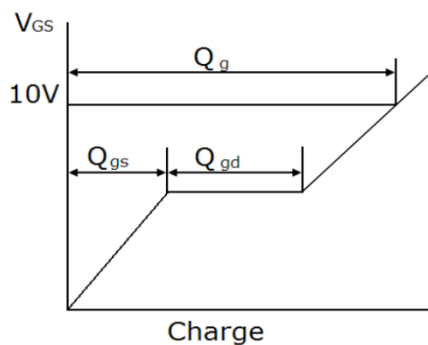
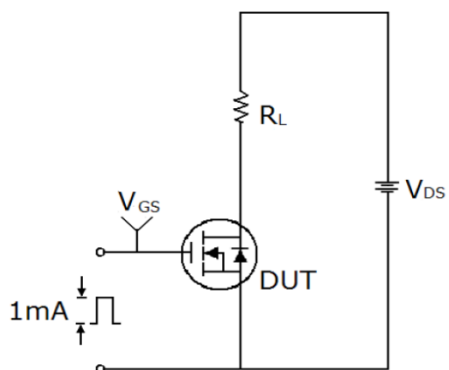


Figure 9. Maximum Safe Operating Area
DFN8*8

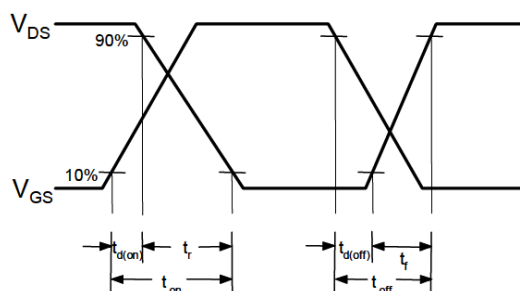
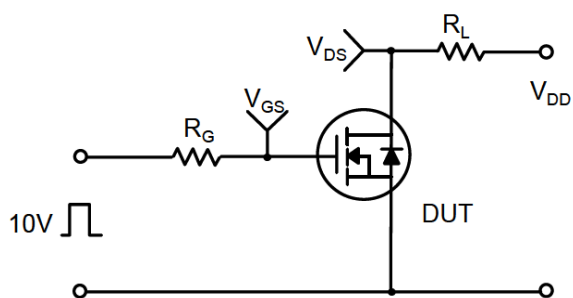


Test Circuits

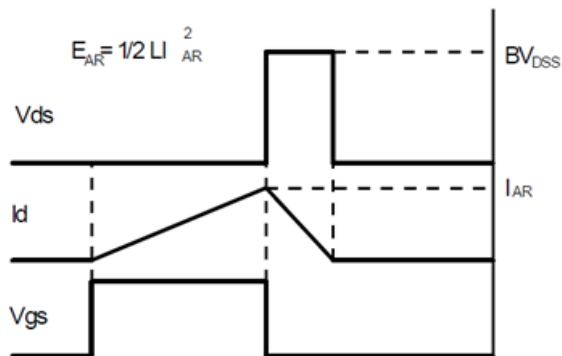
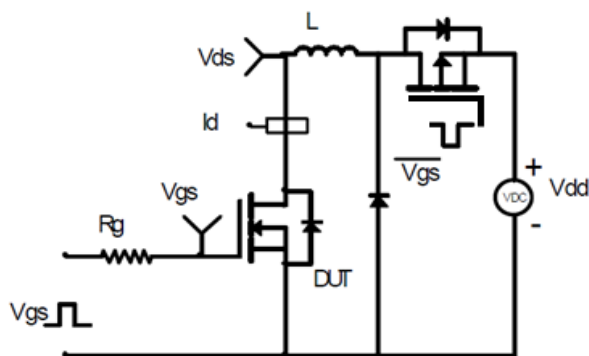
Gate Charge Test Circuit & Waveform



Switching Test Circuit & Waveform



Unclamped Inductive Switching Test Circuit & Waveform



Mechanical Dimensions for DFN8*8

