

HMS20N80

800V N-Channel Super Junction MOSFET

Features

- Very Low FOM ($R_{DS(on)} \times Q_g$)
- Extremely low switching loss
- Excellent stability and uniformity
- 100% Avalanche Tested
- Built-in ESD Diode

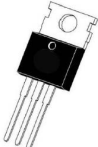
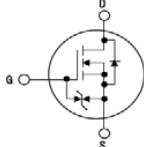
Application

- Switch Mode Power Supply (SMPS)
- TV power & LED Lighting Power
- AC to DC Converters
- Telecom

Key Parameters

Parameter	Value	Unit
$BV_{DSS} @T_{j,max}$	850	V
I_D	20	A
$R_{DS(on), max}$	0.25	Ω
Q_g, Typ	13.7	nC

Package & Internal Circuit

TO-220	SYMBOL
	

Absolute Maximum Ratings

$T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-Source Voltage	800	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current - Continuous ($T_C = 25^{\circ}\text{C}$)	20 *	A
	Drain Current - Continuous ($T_C = 100^{\circ}\text{C}$)	14 *	A
$I_{DM}^{1)}$	Drain Current - Pulsed	60 *	A
$E_{AS}^{2)}$	Single Pulsed Avalanche Energy	56	mJ
I_{AR}	Avalanche Current	1.15	A
dv/dt	MOSFET dv/dt ruggedness, $V_{DS}=0\ldots 400\text{V}$	50	V/ns
dv/dt	Reverse diode dv/dt, $V_{DS}=0\ldots 400\text{V}$, $I_{DS}\leq I_D$	15	V/ns
P_D	Power Dissipation ($T_C = 25^{\circ}\text{C}$)	27	W
$V_{ESD(G-S)}$	Gate source ESD(HBM-C=100pF, R=1.5K Ω)	2000	V
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$

* Drain current limited by maximum junction temperature

Thermal Resistance Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	4.57	$^{\circ}\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	80	$^{\circ}\text{C/W}$

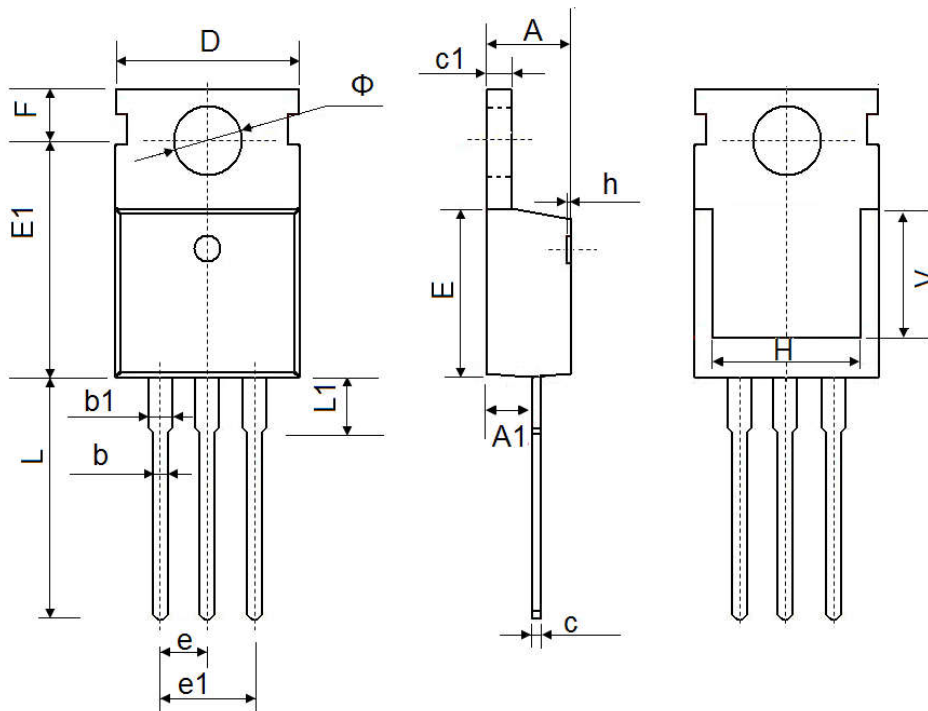
Electrical Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
On Characteristics						
V _{GS}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 220 μA	2.0	-	4.0	V
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} = 10 V, I _D = 1.6 A	-	0.22	0.25	Ω
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1mA	800	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 800 V, V _{GS} = 0	-	-	1	μA
		V _{DS} = 800 V, T _C = 150°C	-	-	100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±1	μA
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 500 V, V _{GS} = 0 V, f = 1.0 MHz	-	564	-	pF
C _{oss}	Output Capacitance		-	13.6	-	pF
C _{rss}	Reverse Transfer Capacitance		-	2.1	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Time	V _{DS} = 400 V, I _D = 2.8 A, R _G = 25 Ω (Note 3,4)	-	18	-	ns
t _r	Turn-On Rise Time		-	16	-	ns
t _{d(off)}	Turn-Off Delay Time		-	72	-	ns
t _f	Turn-Off Fall Time		-	13	-	ns
Q _{g()}	Total Gate Charge	V _{DS} = 640 V, I _D = 2.8 A, V _{GS} = 10 V (Note 3,4)	-	13.7	-	nC
Q _{gs}	Gate-Source Charge		-	2.5	-	nC
Q _{gd}	Gate-Drain Charge		-	4.3	-	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		-	-	7.0	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		-	-	21	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0 V, I _S = 2.8 A	-	-	1.3	V
trr	Reverse Recovery Time	V _R = 400 V, I _F = 2.8 A di _F /dt = 100 A/μs	-	230	-	ns
Qrr	Reverse Recovery Charge		-	1.7	-	μC

Notes :

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $I_{AS}=1.15\text{A}$ $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse Test : Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$
4. Essentially Independent of Operating Temperature

TO-220-3L-C Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150