

**Super Junction Power MOSFET** $V_{DS}=650V, I_D=15A, R_{DS(ON)}=278m\Omega(\text{typ})$ **Features**

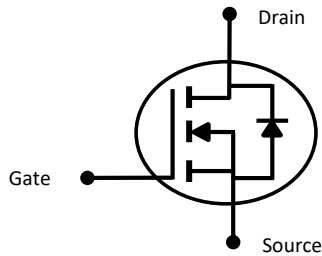
- Low drain-source on-resistance:  $R_{DS(ON)}=278m\Omega(\text{typ})$
- Easy to control gate switching
- Enhancement mode:  $V_{GS(th)}=2.8V$  to  $4.2V$
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

**Applications**

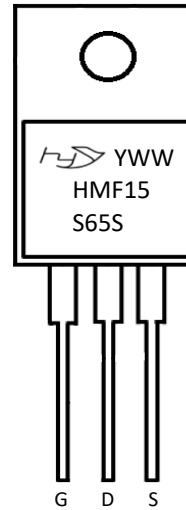
- Telecom / Server Power Supplies
- Industrial Power Supplies
- UPS / Solar
- Lighting / Charger / Adapter

**Ordering Information**

- Package : ITO-220AB
- Quantity Per Tube : 50 pcs

**Device Schematic****Package Outline**

ITO-220AB Top View

**Marking Information**

Date Code : Y=Year WW=Week  
 Marking : HMF15S65S

**Maximum Ratings (@T<sub>J</sub> = +25°C, unless otherwise specified.)**

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	650	V
Gate-Source Voltage (Static)	V <sub>GS</sub>	±20	V
Gate-Source Voltage (Dynamic)		±30	V
Continuous Drain Current @ T <sub>C</sub> =25°C (Note 1.)	I <sub>D</sub>	15	A
Pulsed Drain Current @ T <sub>C</sub> =25°C (Note 2.)	I <sub>D,pulse</sub>	45	
Avalanche Current (Single pulse) T <sub>C</sub> =25°C, V <sub>DD</sub> =50V, L = 10mH, R <sub>G</sub> =25Ω	I <sub>AS</sub>	5	A
Avalanche Energy (Single pulse) T <sub>C</sub> =25°C, V <sub>DD</sub> =50V, L = 10mH, R <sub>G</sub> =25Ω	E <sub>AS</sub>	500	mJ
Power Dissipation @ T <sub>C</sub> =25°C	P <sub>D</sub>	32	W
Soldering Temperature Distance of 1.6mm from case for 10s	T <sub>L</sub>	260	° C
Junction & Storage Temperature	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	° C

Notes: 1.Limited by T<sub>j,max</sub>. Maximum Duty Cycle D = 0.50

2.Pulse width t<sub>p</sub> limited by T<sub>j,max</sub>

**Thermal characteristics**

Parameter	Symbol	Value	Unit
Thermal resistance, junction- case	R <sub>thJC</sub>	3.9	° C/W
Thermal resistance, junction- ambient (device on PCB, minimal footprint)	R <sub>thJA</sub>	80	° C/W

Electrical Characteristics (@T<sub>J</sub> = +25°C, unless otherwise specified.)

## Static Characteristics

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	V(BR)DSS	655	-	-	V
Gate-Source Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V	I <sub>GSS</sub>	-	-	±100	nA
Zero Gate Voltage Drain Current	V <sub>DS</sub> =650V, V <sub>GS</sub> =0V	I <sub>DSS</sub>	-	-	1.0	μA
Gate-Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	V <sub>GS(th)</sub>	2.8	-	4.2	V
Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =7.5A	R <sub>DS(ON)</sub>	-	278	300	mΩ
Gate Resistance (Intrinsic)	F=1MHz, open drain	R <sub>G</sub>	-	5.7	-	Ω

## Dynamic Characteristics

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =50V, F=10kHz	C <sub>ISS</sub>	-	1020	-	pF
Output Capacitance		C <sub>OSS</sub>	-	108	-	pF
Reverse Transfer Capacitance		C <sub>RSS</sub>	-	5.11	-	pF
Turn-On Delay Time	V <sub>DD</sub> =400V, V <sub>GS</sub> =13V I <sub>D</sub> =3.8A, R <sub>G</sub> =10Ω	t <sub>d(on)</sub>	-	8	-	ns
Turn-On Rise Time		t <sub>r</sub>	-	21	-	ns
Turn-Off Delay Time		t <sub>d(off)</sub>	-	32.4	-	ns
Turn-Off Fall Time		t <sub>f</sub>	-	20.8	-	ns

## Gate Charge Characteristics

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Gate Plateau Voltage	V <sub>DD</sub> =400V, I <sub>D</sub> =3.8A V <sub>GS</sub> =0 to 10V	V <sub>plateau</sub>	-	5.4	-	V
Total Gate Total		Q <sub>g</sub>	-	22.94	-	nC
Gate Source Charge		Q <sub>gs</sub>	-	5.7	-	nC
Gate Drain Charge		Q <sub>gd</sub>	-	13.6	-	nC

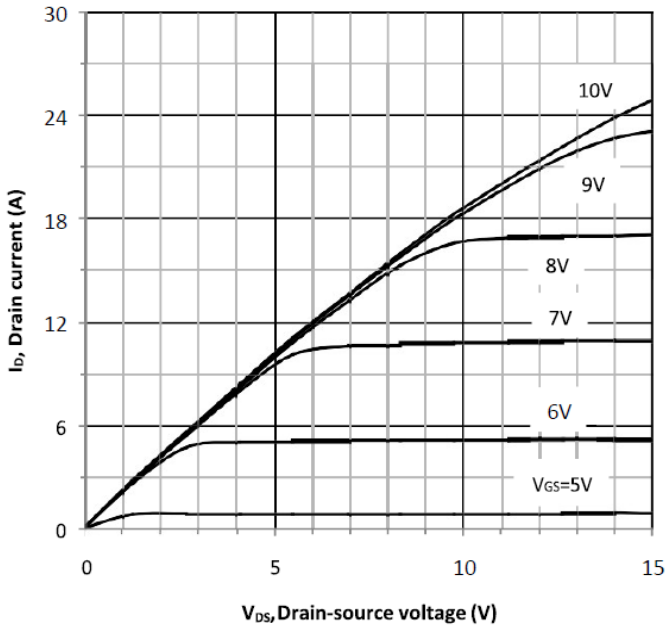
## Reverse diode characteristics

Parameter	Test Conditions	Symbol	Min	Typ	Max	Unit
Drain Forward Voltage	I <sub>F</sub> =1A, V <sub>GS</sub> =0V	V <sub>SD</sub>	-	0.74	-	V
Body Diode Reverse Recovery Time	V <sub>R</sub> =400V, I <sub>F</sub> =2A diF/dt=100A/μs	t <sub>rr</sub>	-	216	-	ns
Body Diode Reverse Recovery Charge		Q <sub>rr</sub>	-	1.3	-	nC
Peak Reverse Recovery Current		I <sub>rrm</sub>	-	16.7	-	A



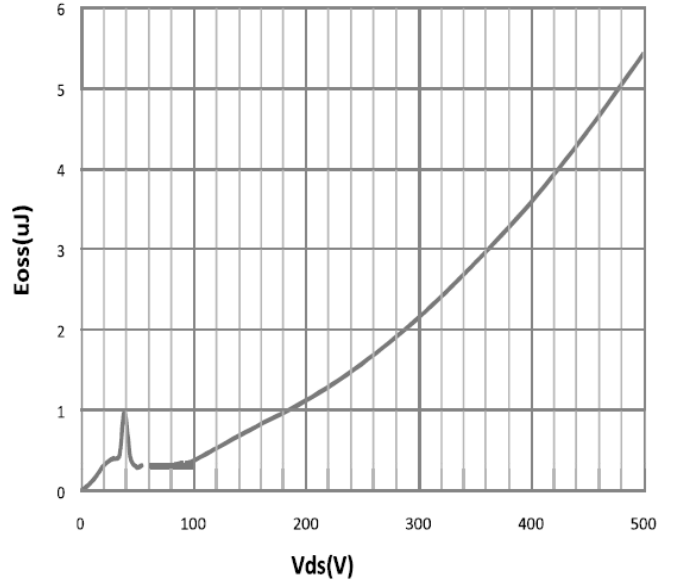
### Rating and Characteristic Curves

Diagram 1: Typ. output characteristics



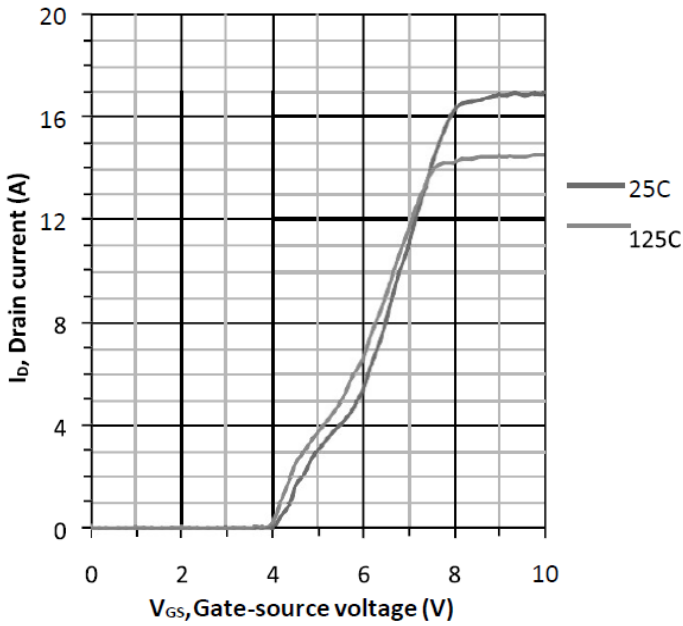
$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$

Diagram 2: Typ. Coss stored energy



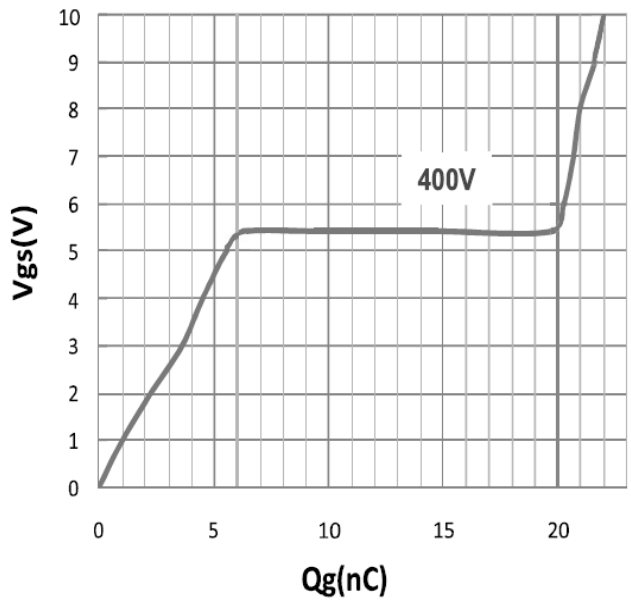
$E_{oss} = f(V_{DS})$

Diagram 3: Typ. transfer characteristics



$I_D = f(V_{GS}); \text{parameter: } T_j$

Diagram 4: Typ. gate charge

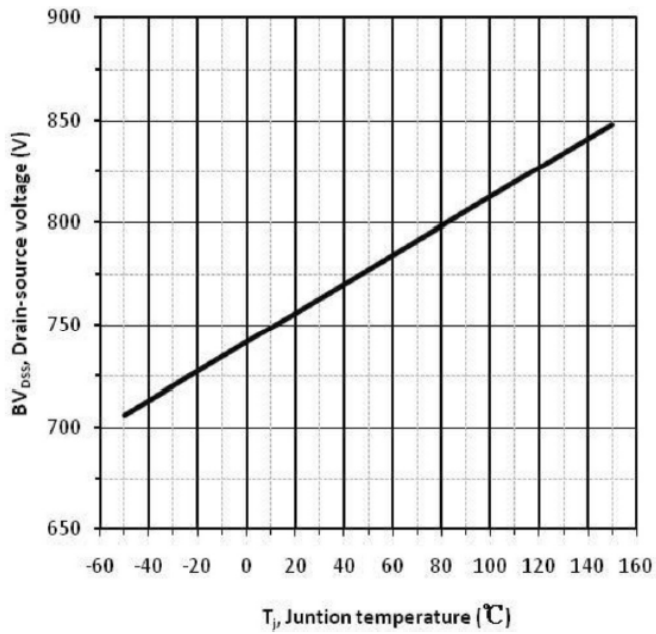


$V_{GS} = f(Q_{gate}); I_D = 3.8A \text{ pulsed}; \text{parameter: } V_{DD}$



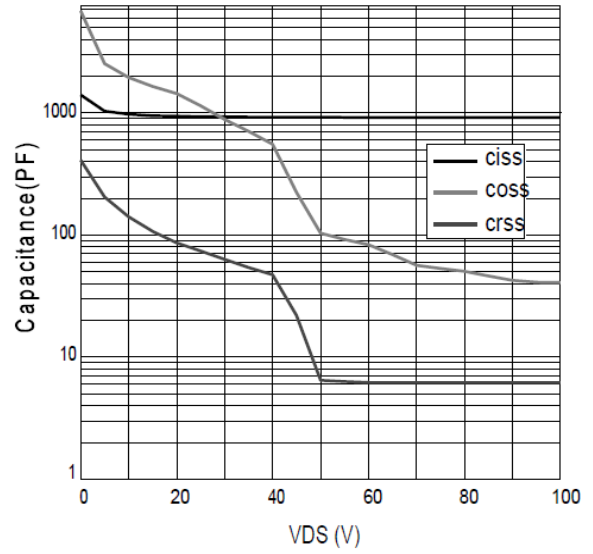
## Rating and Characteristic Curves

Diagram 5: Drain-source breakdown voltage



$V_{BR(DSS)} = f(T_j); I_D = 10\text{mA}$

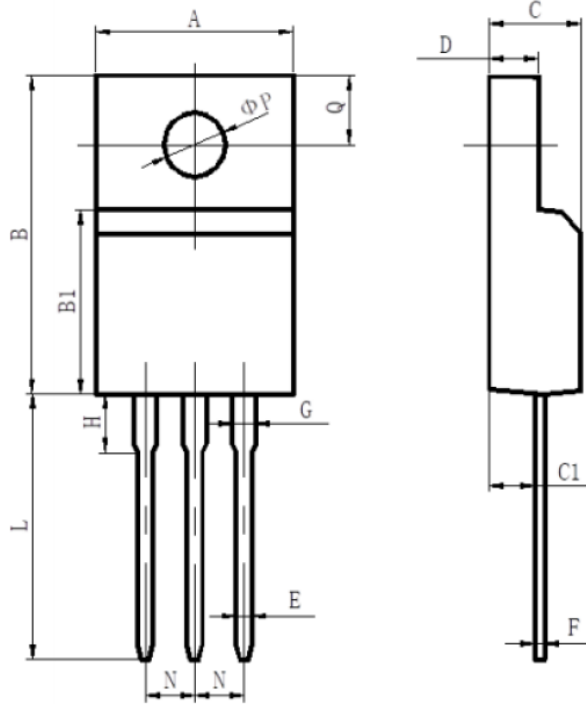
Diagram 6: Typ. Capacitances



$C = f(V_{DS}); V_{GS} = 0\text{V}; f = 10\text{ kHz}$



## Package Outline Dimensions



ITO-220AB Package		
Dim	Min	Max
A	9.70	10.30
B	15.50	16.10
B1	8.99	9.39
C	4.40	4.80
C1	2.15	2.55
D	2.50	2.90
E	0.70	0.90
F	0.40	0.60
G	1.12	1.42
H	3.20	3.80
L	12.60	13.60
N	2.34	2.74
Q	3.15	3.55
$\phi P$	3.00	3.30



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