

## Silicon N-Channel Power MOSFET

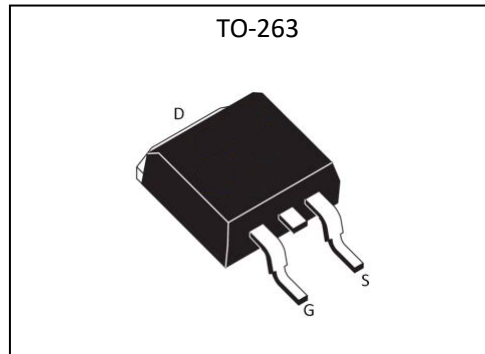
### General Description:

The HMD120N10 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications. The package form is TO-263, which accords with the RoHS standard.

$V_{DSS}$	100	V
$I_D$	120	A
$P_D$	200	W
$R_{DS(ON)type}$	4.5	m $\Omega$

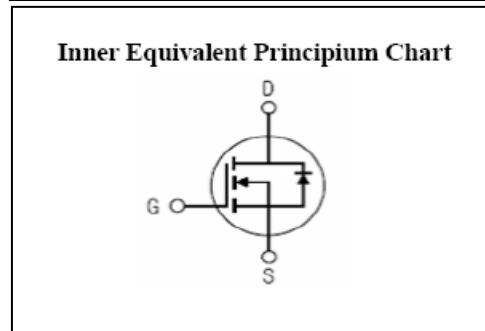
### Features:

- $R_{DS(ON)} < 6m\Omega$  @  $V_{GS}=10V$  (Typ4.5m $\Omega$ )
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation



### Applications:

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



### Absolute (Tc= 25°C unless otherwise specified):

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage <sup>a1</sup>	100	V
$I_D$	Continuous Drain Current <sup>a2</sup>	120	A
$I_{DM}$	Pulsed Drain Current <sup>a2a4</sup>	480	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$P_D$	Power Dissipation	200	W
$E_{AS}$	Single pulse avalanche energy <sup>a5</sup>	850	mJ
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	175, -55 to 175	$^{\circ}C$

**Electrical Characteristics** (Tc=25°C unless otherwise specified) :

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
V <sub>DSS</sub>	Drain to Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	100	--	--	V
I <sub>DSS</sub>	Drain to Source Leakage Current	V <sub>DS</sub> =100V, V <sub>GS</sub> = 0V, T <sub>a</sub> = 25°C	--	--	5.0	μA
I <sub>GSS(F)</sub>	Gate to Source Forward Leakage	V <sub>GS</sub> = +20V	--	--	0.1	μA
I <sub>GSS(R)</sub>	Gate to Source Reverse Leakage	V <sub>GS</sub> = -20V	--	--	-0.1	μA

<b>ON Characteristics<sup>a3</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
R <sub>DS(ON)</sub>	Drain-to-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =60A	--	4.5	6.0	mΩ
V <sub>GS(TH)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.0	--	3.0	V

Pulse width tp ≤ 380μs, δ ≤ 2%

<b>Dynamic Characteristics<sup>a4</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =60A	70	--	--	S
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V f=1.0MHz	--	530	--	pF
C <sub>oss</sub>	Output Capacitance		--	550	--	
C <sub>rss</sub>	Reverse Transfer Capacitance		--	25	--	

<b>Resistive Switching Characteristics<sup>a4</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
t <sub>d(ON)</sub>	Turn-on Delay Time	V <sub>DD</sub> =50V, I <sub>D</sub> =60A V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω	--	20	--	ns
t <sub>r</sub>	Rise Time		--	13	--	
t <sub>d(OFF)</sub>	Turn-Off Delay Time		--	40	--	
t <sub>f</sub>	Fall Time		--	12	--	
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =50V, I <sub>D</sub> =60A V <sub>GS</sub> =10V	--	90	--	nC
Q <sub>gs</sub>	Gate to Source Charge		--	25	--	
Q <sub>gd</sub>	Gate to Drain ( "Miller" )Charge		--	20	--	

Source-Drain Diode Characteristics						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_S$	Continuous Source Current <sup>a2</sup> (Body Diode)		--	--	120	A
$V_{SD}$	Diode Forward Voltage	$I_S = 120A, V_{GS} = 0V$	--	--	1.5	V
$T_{rr}$	Reverse Recovery Time	$T_J = 25^\circ C, I_F = 60A, di/dt = 100A/\mu s$	--	70	--	ns
$Q_{rr}$	Reverse Recovery Charge		--	140	--	nc

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case <sup>a2</sup>	0.75	$^\circ C/W$

<sup>a1</sup>:  $T_J = +25^\circ C$  to  $+175$

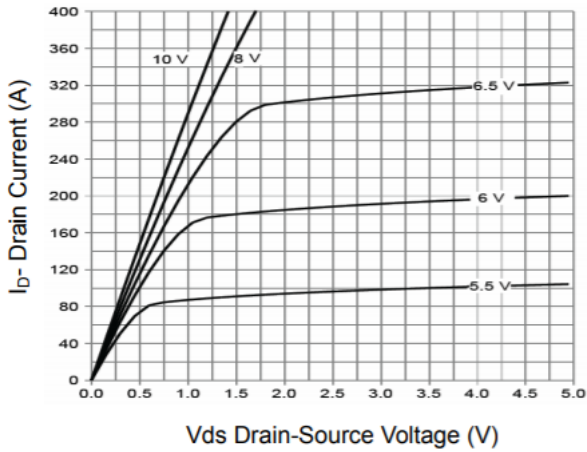
<sup>a2</sup>: Silicon limited current only..

<sup>a3</sup>: Package limited current.

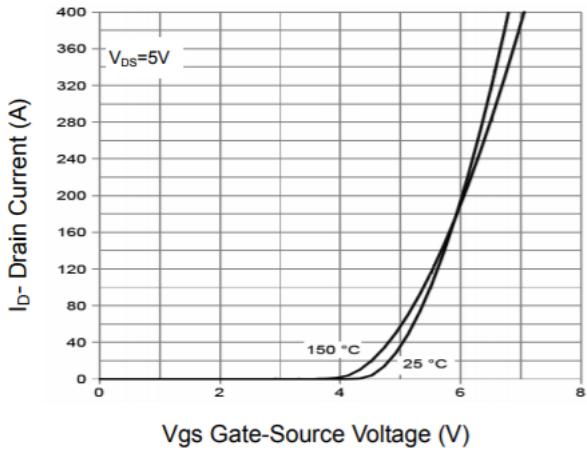
<sup>a4</sup>: Repetitive rating; pulse width limited by maximum junction temperature.

<sup>a5</sup>: Pulse width  $\leq 380\mu s$ ; duty cycle  $\leq 2\%$ .

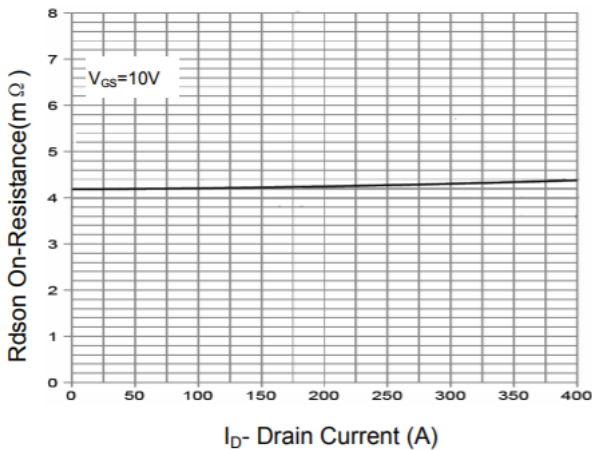
**Characteristics Curve :**



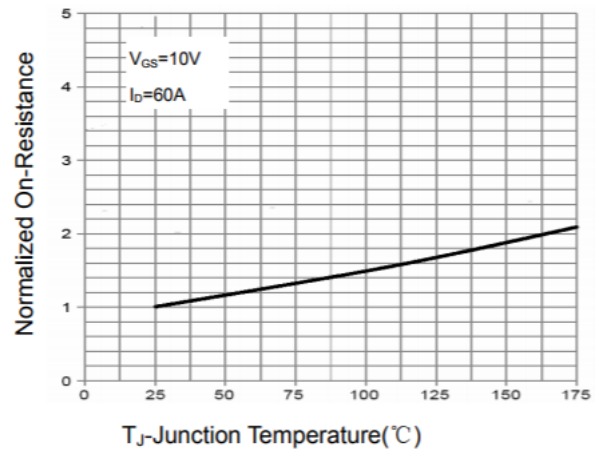
**Figure 1 Output Characteristics**



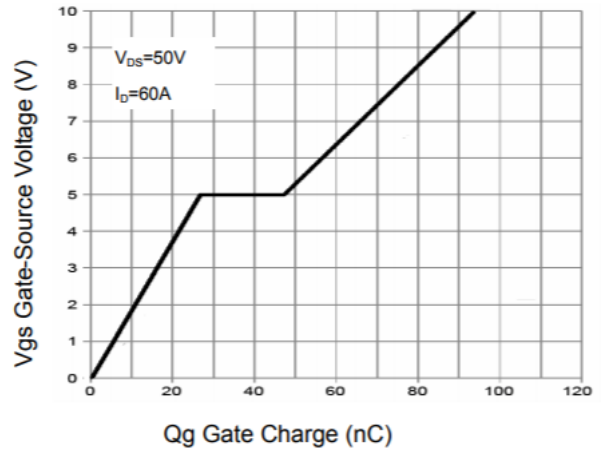
**Figure 2 Transfer Characteristics**



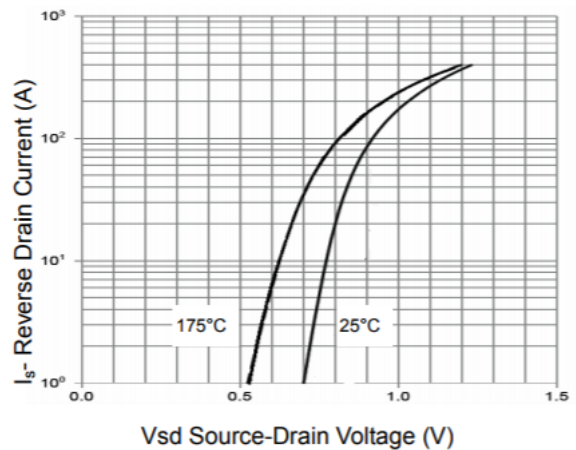
**Figure 3 Rdson- Drain Current**



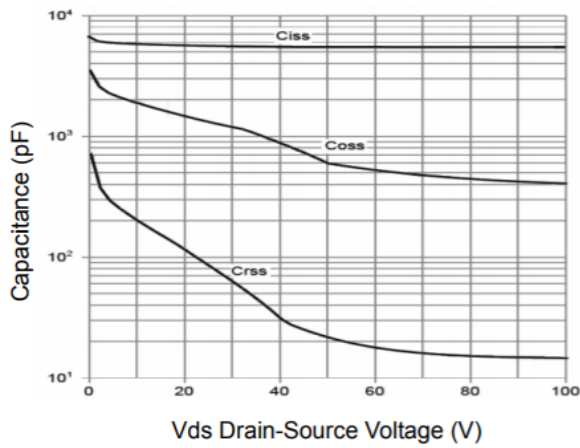
**Figure 4 Rdson-Junction Temperature**



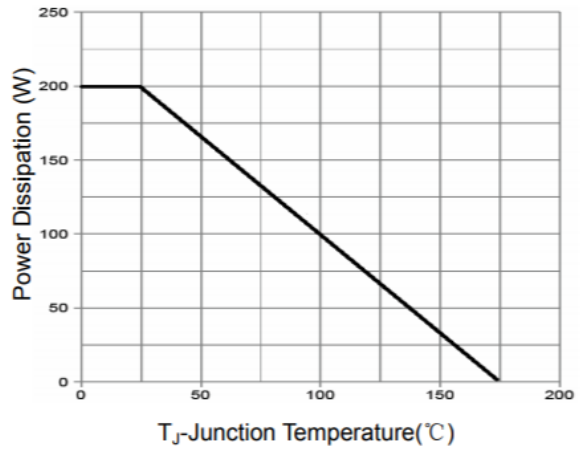
**Figure 5 Gate Charge**



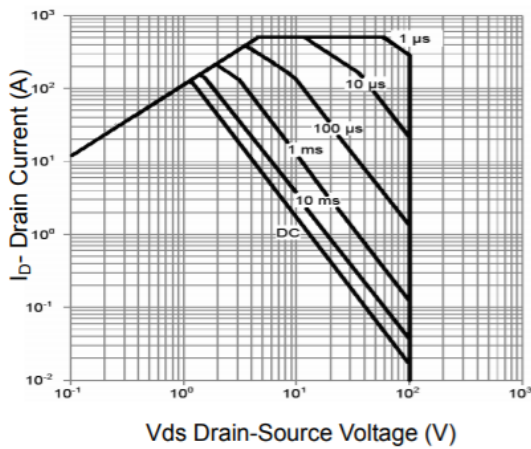
**Figure 6 Source- Drain Diode Forward**



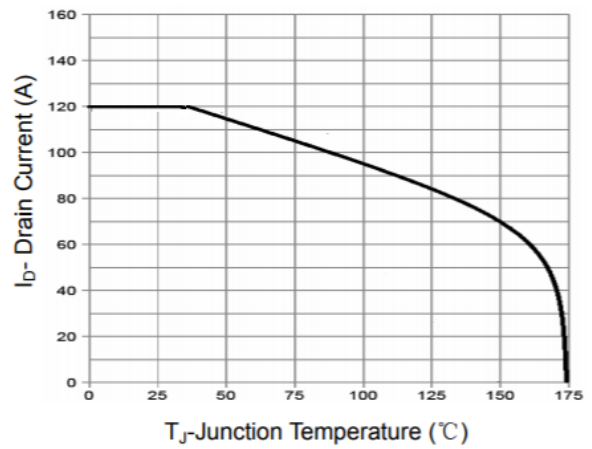
**Figure 7 Capacitance vs Vds**



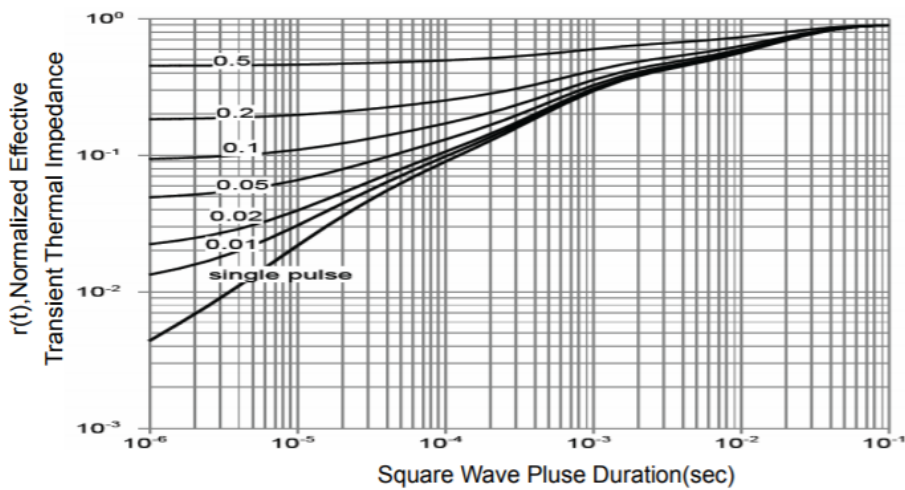
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**



**Figure 10 Current De-rating**



**Figure 11 Normalized Maximum Transient Thermal Impedance**