STB120NH03L - STI120NH03L STP120NH03L

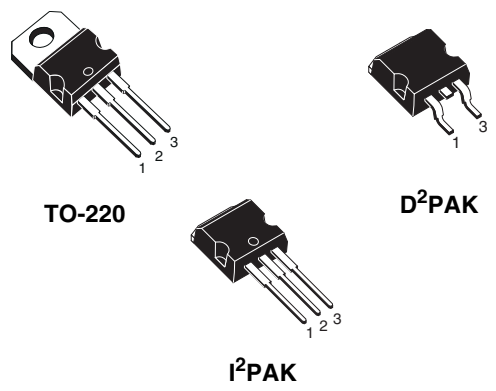
N-channel 30V - 0.005Ω - 60A - TO-220 / D^2PAK / I^2PAK
STripFET™ Power MOSFET for DC-DC conversion

General features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STB120NH03L	30V	<0.0055Ω	60(1)
STP120NH03L	30V	<0.0055Ω	60(1)
STI120NH03L	30V	<0.0055Ω	60(1)

1. Value limited by wire bonding

- $R_{DS(on)}$ *Qg industry's benchmark Low
- Conduction losses reduced
- Switching losses reduced
- Low Threshold device



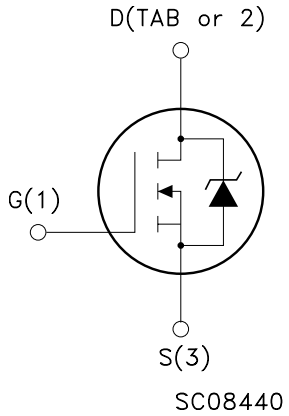
Description

These devices utilizes the latest advanced design rules of ST's proprietary STripFET™ technology. It is ideal in high performance DC-DC converter applications where efficiency is to be achieved at very high output currents.

Applications

- Switching application

Internal schematic diagram



Order codes

Part number	Marking	Package	Packaging
STB120NH03L	B120NH03L	D^2PAK	Tape & reel
STI120NH03L	120NH03L	I²PAK	Tube
STP120NH03L	P120NH03L	TO-220	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0V)	30	V
V_{GS}	Gate-source voltage	± 20	V
I_D (1)	Drain current (continuous) at T_C = 25°C	60	A
I_D (1)	Drain current (continuous) at T_C = 100°C	60	A
I_{DM} (2)	Drain current (pulsed)	240	A
P_{TOT}	Total dissipation at T_C = 25°C	110	W
	Derating factor	0.73	W/°C
EAS (3)	Single pulse avalanche energy	700	mJ
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 175	°C

1. Value limited by wire bonding
2. Pulse width limited by safe operating area
3. Starting T_J = 25°C, I_D = 30A, $V_{DD} \leq$ 30V

Table 2. Thermal data

R_{thJC}	Thermal resistance junction-case max	1.30	°C/W
R_{thJA}	Thermal resistance junction-amb max	62.5	°C/W
T_l	Maximum lead temperature for soldering purpose	300	°C

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified)

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250µA, V_{GS}= 0	30			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating, T_C=125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	µA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250µA	1	1.8	3	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS} = 10V, I_D = 30A V_{GS} = 5V, I_D = 30A		0.005 0.006	0.0055 0.0105	Ω Ω

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25V, f = 1MHz, V_{GS} = 0		4100 680 70		pF pF pF
$t_{d(on)}$ t_r $t_{d(off)}$ t_f	Turn-on delay time Rise time Off voltage rise time Fall time	V_{DD} = 15V, I_D = 30A, R_G = 4.7Ω, V_{GS} = 10V		16 95 48 23		ns ns ns ns
Rg	Gate input resistance	f = 1MHz gate DC bias=0 test signal level=20mV open drain		1.3		Ω
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD}=15V, I_D = 60A V_{GS} =10V		57 12 7	77	nC nC nC
Q_{oss} (1)	Output charge	V_{DS} = 24V, V_{GS} = 0		27		ns
Q_{gls} (2)	Third-quadrant gate charge	V_{DS} < 0, V_{GS}= 0V		55		ns

1. Qoss = Coss* ΔV_{IN}, Coss = Cgd + Cds. See power losses calculation
2. Gate charge for synchronous operation.

Table 5. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}	Source-drain current Source-drain current (pulsed)				60 240	A A
V_{SD} (1)	Forward on voltage	I_{SD} = 30A, V_{GS} = 0			1.4	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 60A, di/dt = 100A/µs, V_{DD} = 30V, T_J =150°C		46 64 2.8		ns nC A

1. Pulsed: pulse duration = 300µs, duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

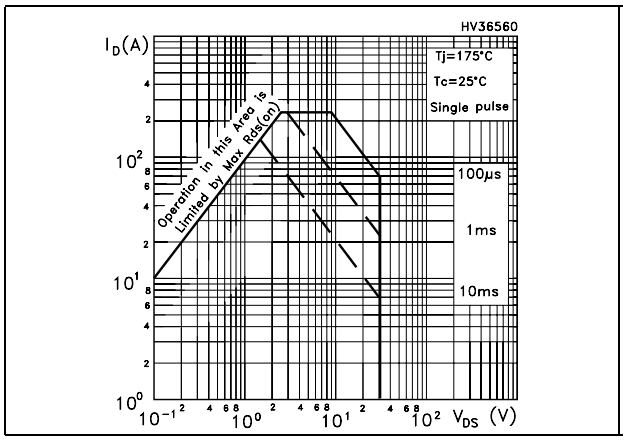


Figure 2. Thermal impedance

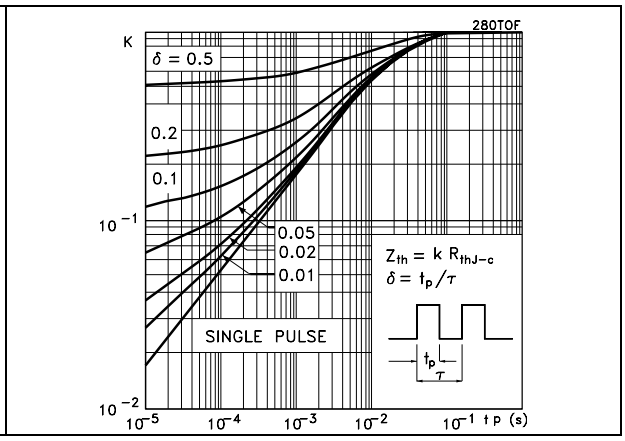


Figure 3. Output characteristics

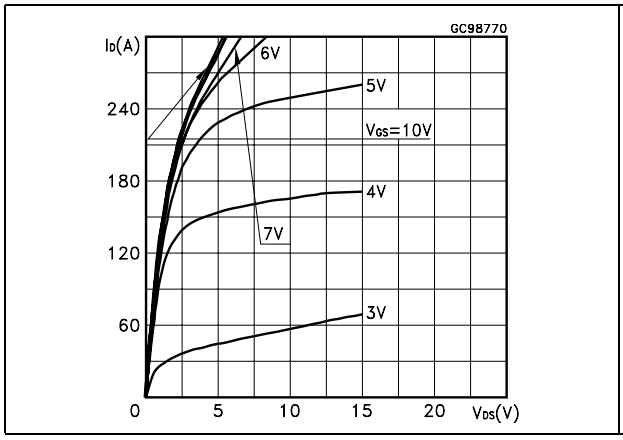


Figure 4. Transfer characteristics

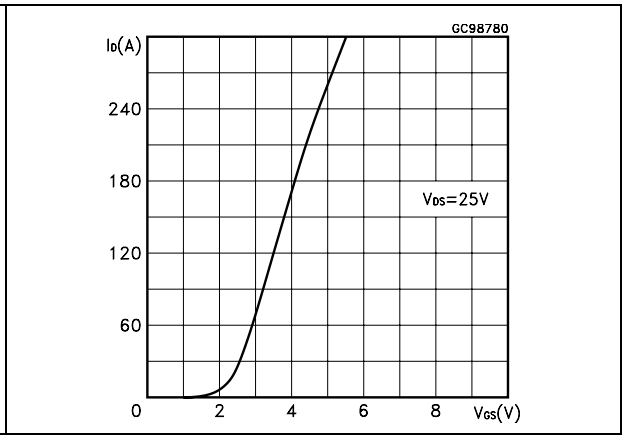


Figure 5. Normalized B_{VDSS} vs temperature

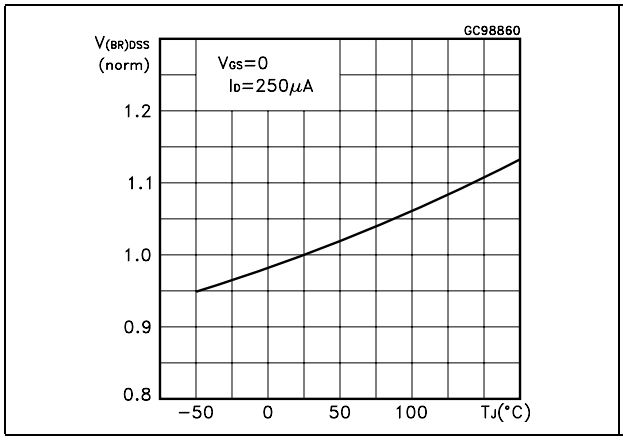


Figure 6. Static drain-source on resistance