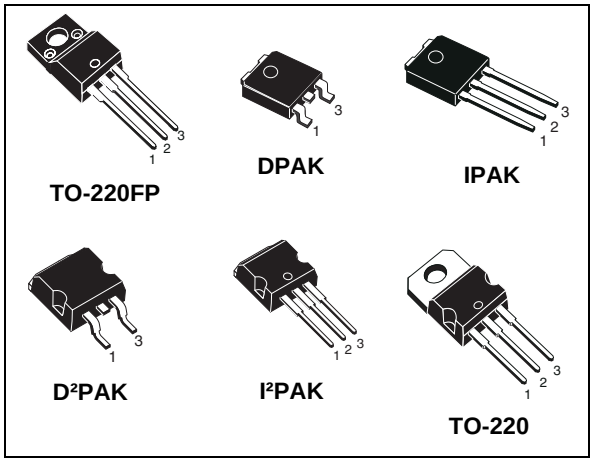
STB60N55F3, STD60N55F3, STF60N55F3 STI60N55F3, STP60N55F3, STU60N55F3

N-channel 55 V, 6.5 mΩ, 80 A, DPAK, IPAK, D^{2}PAK, I^{2}PAK, TO-220 TO-220FP STripFET™ III Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D	Pw
STB60N55F3	55V	<8.5mΩ	80A	110W
STD60N55F3	55V	<8.5mΩ	80A	110W
STF60N55F3	55V	<8.5mΩ	42A	30W
STI60N55F3	55V	<8.5mΩ	80A	110W
STP60N55F3	55V	<8.5mΩ	80A	110W
STU60N55F3	55V	<8.5mΩ	80A	110W

- Standard threshold drive
- 100% avalanche tested



Application

- Switching applications

Description

This STripFET™ III Power MOSFET technology is among the latest improvements, which have been especially tailored to minimize on-state resistance providing superior switching performances.

Figure 1. Internal schematic diagram

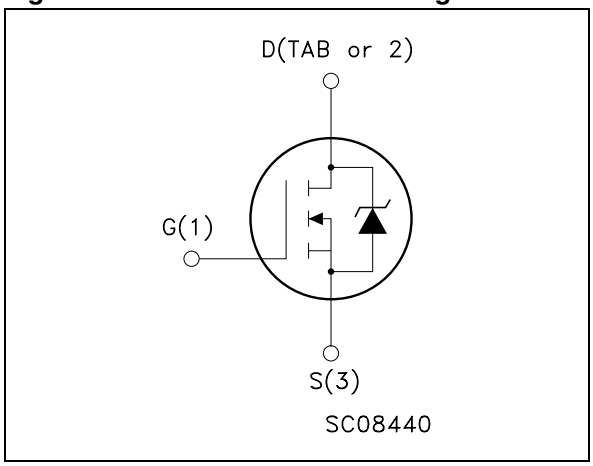


Table 1. Device summary

Order codes	Marking	Package	Packaging
STB60N55F3	60N55F3	D²PAK	Tape and reel
STD60N55F3	60N55F3	DPAK	Tape and reel
STF60N55F3	60N55F3	TO-220FP	Tube
STI60N55F3	60N55F3	I²PAK	Tube
STP60N55F3	60N55F3	TO-220	Tube
STU60N55F3	60N55F3	IPAK	Tube

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		DPAK/D²PAK TO-220 IPAK/I²PAK	TO-220FP	
V_{DS}	Drain-source voltage (V_{GS}=0)	55		V
V_{GS}	Gate-source voltage	± 20		V
I_D	Drain current (continuous) at T_C = 25°C	80	42	A
I_D	Drain current (continuous) at T_C = 100°C	56	30	A
I_{DM} (1)	Drain current (pulsed)	320	168	A
P_{TOT}	Total dissipation at T_C = 25°C	110	30	W
	Derating factor	0.73	0.2	W/°C
dv/dt (2)	Peak diode recovery voltage slope	11		V/ns
E_{AS} (3)	Single pulse avalanche energy	390		mJ
V_{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink (t=1s;T_C=25°C)		2500	V
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 175		°C

1. Pulse width limited by safe operating area
2. $I_{SD} \leq 80$ A, di/dt $\leq$300A/µs, $V_{DD} \leq V_{(BR)DSS}$. Tj $\leq$ Tjmax
3. Starting Tj=25°C, Id=32 A, Vdd= 25 V

Table 3. Thermal resistance

Symbol	Parameter	Value					Unit
		DPAK	IPAK I²PAK	D²PAK	TO-220	TO-220FP	
Rthj-case	Thermal resistance junction-case max	1.36				5	°C/W
Rthj-pcb (1)	Thermal resistance junction-pcb max	50		35			°C/W
Rthj-a	Thermal resistance junction-ambient max		100		62.5		°C/W
T_l	Maximum lead temperature for soldering purpose		275		300		°C

1. When mounted on FR-4 board of 1inch², 2oz Cu

2 Electrical characteristics

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

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250µA, V_{GS}= 0	55			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating,Tc = 125°C			10 100	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±200	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2		4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 32A		6.5	8.5	mΩ

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} =25V, I_D=32A	-	50		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} = 25V, f = 1MHz, V_{GS}=0	-	2200 500 25		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 27V, I_D = 65A V_{GS} =10V	-	33.5 12.5 9.5	45	nC nC nC

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

Table 6. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time Rise time	V_{DD} = 27V, I_D = 32A, R_G = 4.7Ω, V_{GS} = 10V	-	20 50	-	ns ns
$t_{d(off)}$ t_f	Turn-off delay time Fall time	V_{DD} = 27V, I_D = 32A, R_G = 4.7Ω, V_{GS} = 10V	-	35 11.5	-	ns ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Packages	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)		DPAK-D^{2}PAK-I^{2}PAK-I^{2}PAK-TO-220	-		80 320	A A
I_{SD} I_{SDM} (1)	Source-drain current Source-drain current (pulsed)		TO-220FP	-		42 168	A A
V_{SD}	Forward on voltage	I_{SD} = 65A, V_{GS} = 0		-		1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 65A, V_{DD} = 30V di/dt = 100A/µs, Tj = 150°C		-	47 87 3.7		ns nC A

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

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area for TO-220 D²PAK / IPAK / I²PAK / DPAK

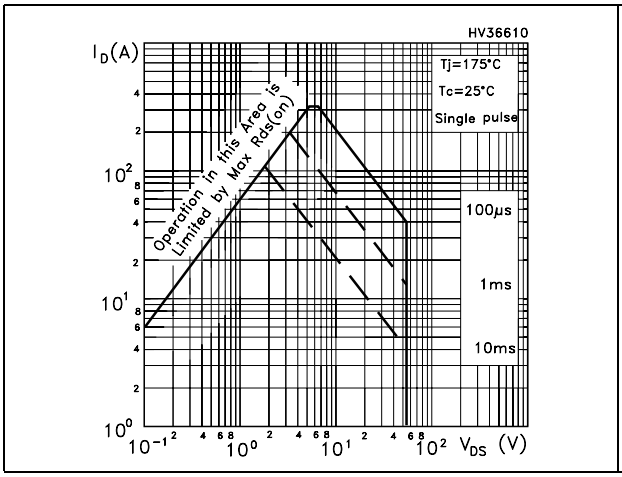


Figure 3. Thermal impedance for TO-220 D²PAK / IPAK / I²PAK / DPAK

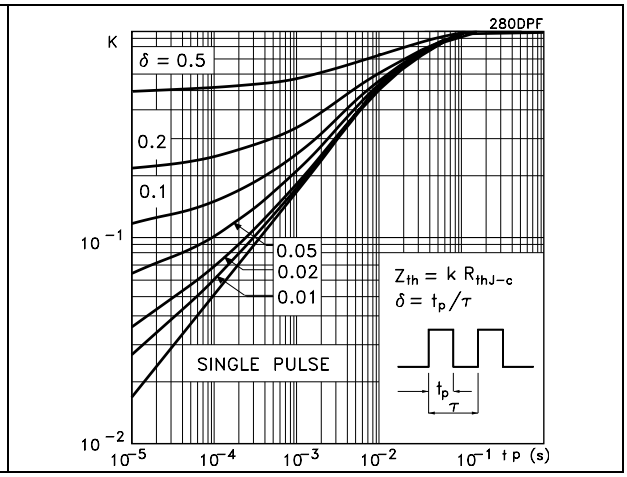


Figure 4. Safe operating area for TO-220FP

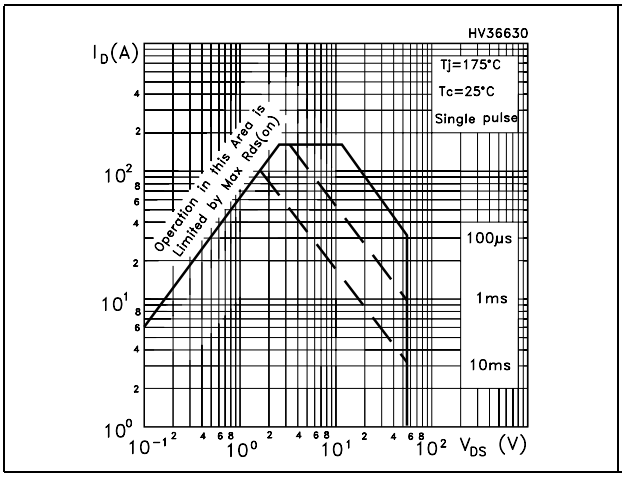


Figure 5. Thermal impedance for TO-220FP