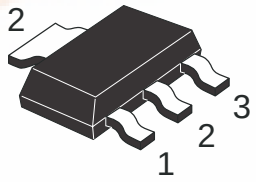
STN1NC60

N-CHANNEL 600V - 12Ω - 0.3A - SOT-223
PowerMesh™II MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STN1NC60	600 V	<15Ω	0.3 A

- TYPICAL $R_{DS}(on)$ = 12Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- NEW HIGH VOLTAGE BENCHMARK
- GATE CHARGE MINIMIZED



SOT-223

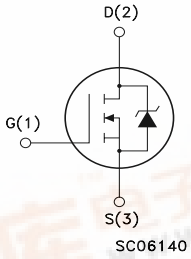
DESCRIPTION

The PowerMESH™II is the evolution of the first generation of MESH OVERLAY™. The layout refinements introduced greatly improve the Ron*area figure of merit while keeping the device at the leading edge for what concerns swithing speed, gate charge and ruggedness.

APPLICATIONS

- AC ADAPTORS AND BATTERY CHARGERS
- SWITH MODE POWER SUPPLIES (SMPS)

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	600	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	600	V
V_{GS}	Gate- source Voltage	±30	V
I_D	Drain Current (continuos) at T_C = 25°C	0.3	A
I_D	Drain Current (continuos) at T_C = 100°C	0.18	A
I_{DM} (1)	Drain Current (pulsed)	1.2	A
P_{TOT}	Total Dissipation at T_C = 25°C	2.5	W
	Derating Factor	0.02	W/°C
dv/dt	Peak Diode Recovery voltage slope	3	V/ns
T_{stg}	Storage Temperature	–60 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•)Pulse width limited by safe operating area

(1)I_{SD} ≤0.3A, di/dt ≤100A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}

THERMAL DATA

Rthj-pcb	Thermal Resistance Junction-PC Board	50	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max (Surface Mounted)	60	°C/W
T_l	Maximum Lead Temperature For Soldering Purpose	260	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	0.3	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	60	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	I_D = 250 µA, V_{GS} = 0	600			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			1	µA
		V_{DS} = Max Rating, T_C = 125 °C			50	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ±30V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D =0.5 A		12	15	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, V_{GS} = 10V	1			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, I_D = 0.5A		0.87		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		108		pF
C_{oss}	Output Capacitance			18		pF
C_{rss}	Reverse Transfer Capacitance			2.5		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	V_{DD} = 300V, I_D = 0.5A R_G = 4.7Ω V_{GS} = 10V (see test circuit, Figure 3)		7.2 8		ns ns
Q_g	Total Gate Charge	V_{DD} = 480V, I_D = 1A, V_{GS} = 10V		7.3	10	nC
Q_{gs}	Gate-Source Charge			3.4		nC
Q_{gd}	Gate-Drain Charge			2.5		nC

SWITCHING OFF

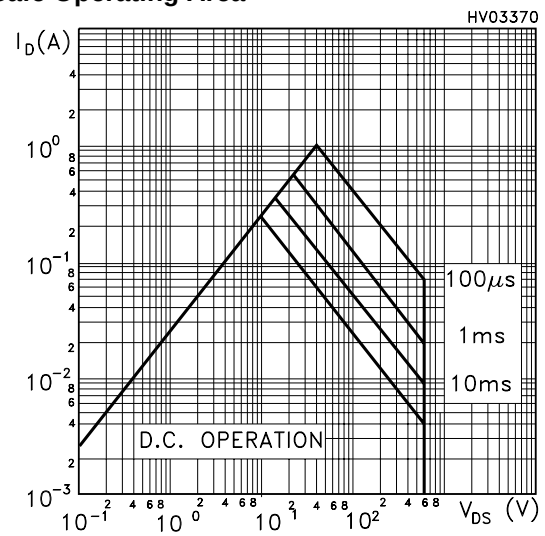
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 480V, I_D = 1A, R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 5)		33		ns
t_f	Fall Time			11		ns
t_c	Cross-over Time			43		ns

SOURCE DRAIN DIODE

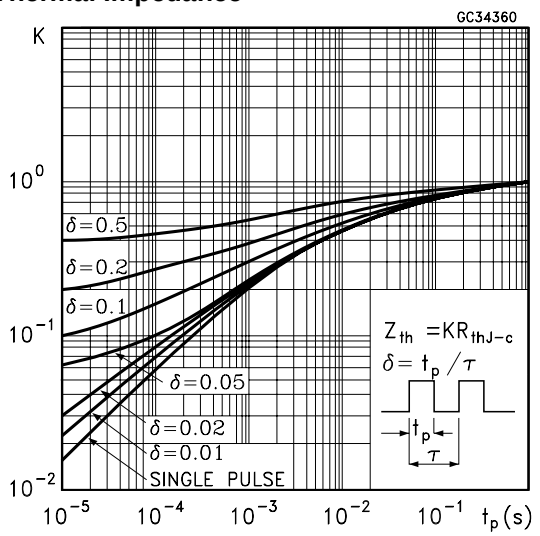
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				0.3	A
I_{SDM} (2)	Source-drain Current (pulsed)				1.2	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 0.3 A, V_{GS} = 0			1.6	V
t_{rr}	Reverse Recovery Time	I_{SD} = 1A, di/dt = 100A/µs, V_{DD} = 25V, Tj = 150°C (see test circuit, Figure 5)		450		ns
Q_{rr}	Reverse Recovery Charge			720		µC
I_{RRM}	Reverse Recovery Current			3.2		A

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

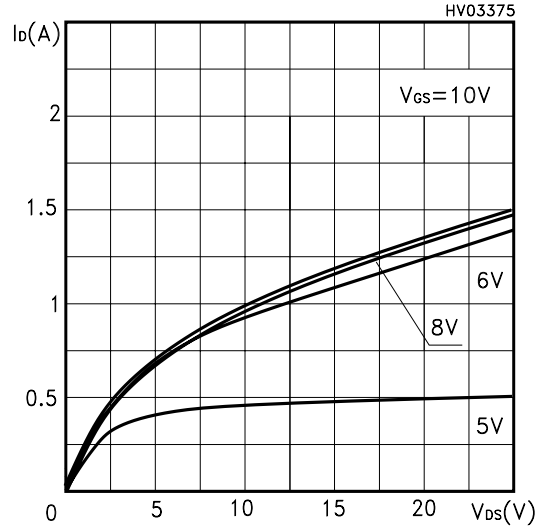
Safe Operating Area



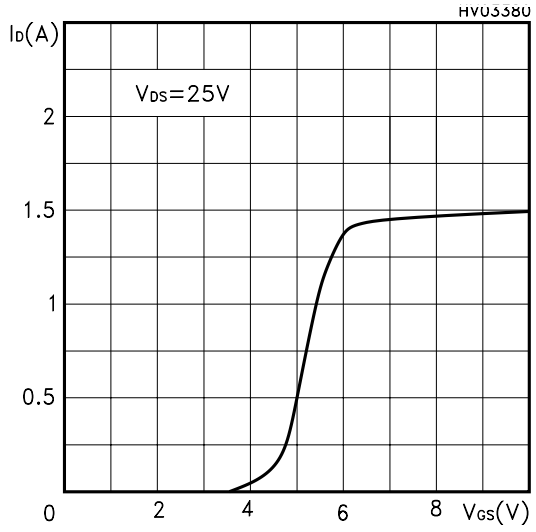
Thermal Impedance



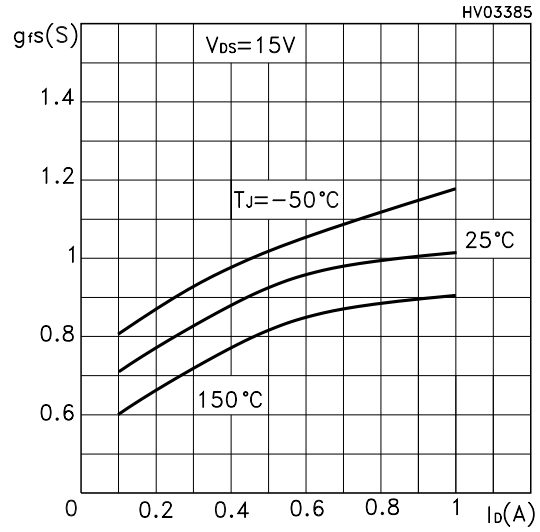
Output Characteristics



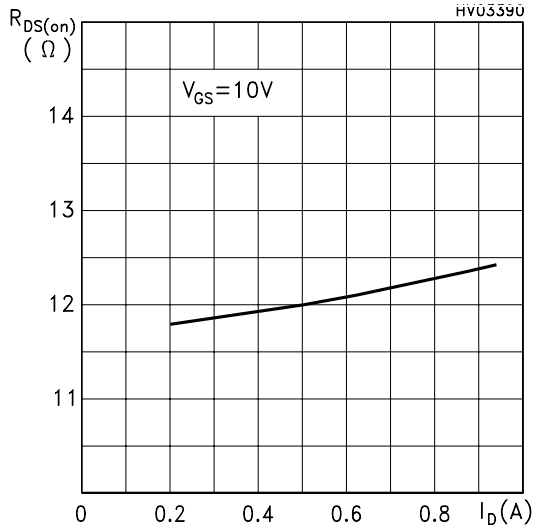
Transfer Characteristics



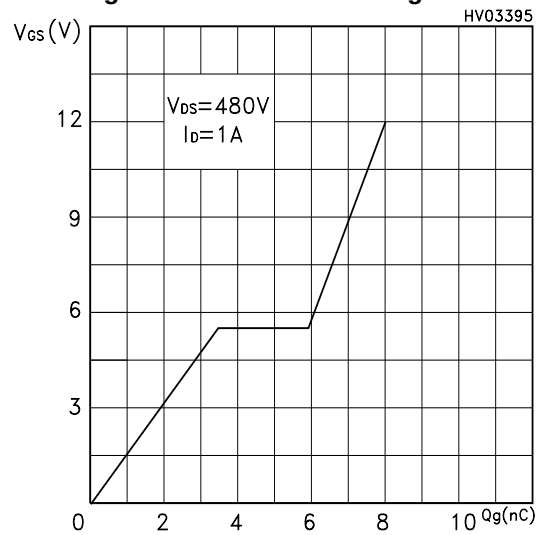
Tranconductance



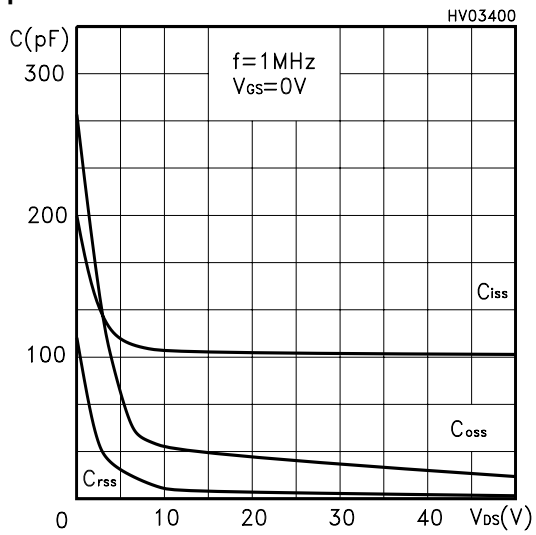
Static Drain-Source On Resistance



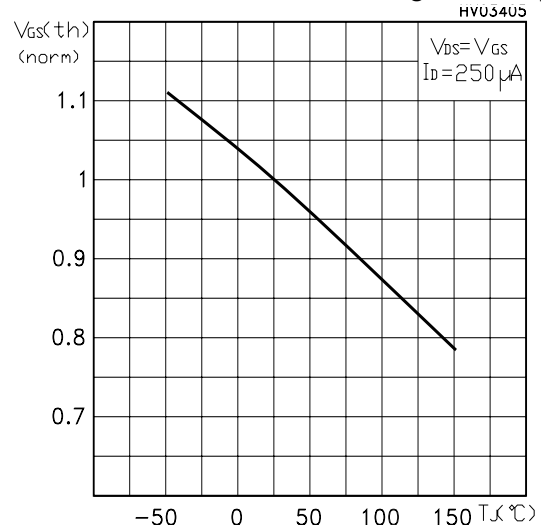
Gate Charge vs Gate-source Voltage



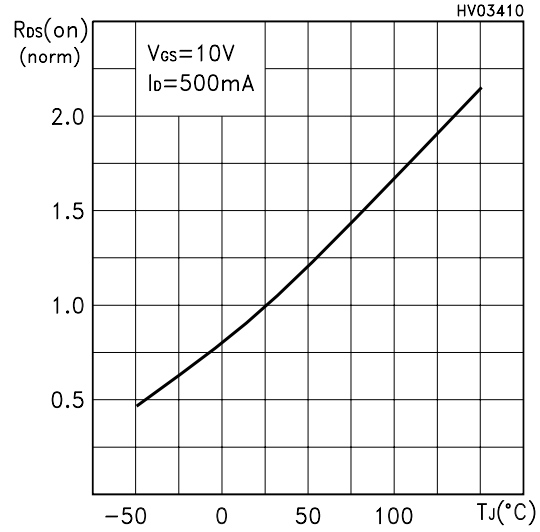
Capacitance Variations



Normalized Gate Thereshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

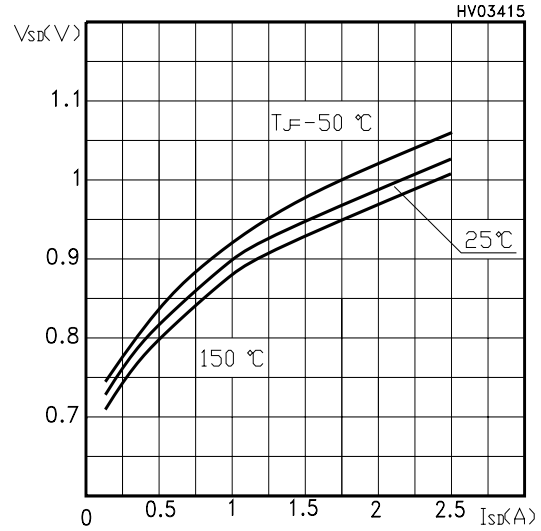


Fig. 1: Unclamped Inductive Load Test Circuit

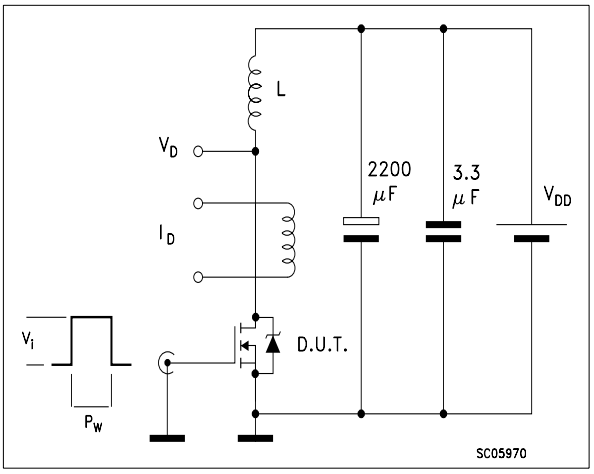


Fig. 2: Unclamped Inductive Waveform

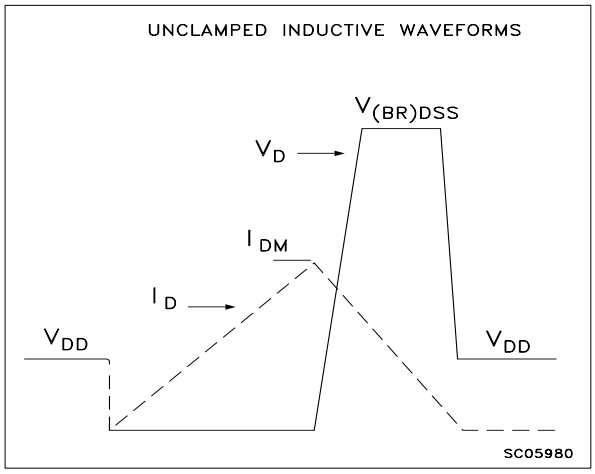


Fig. 3: Switching Times Test Circuits For Resistive Load

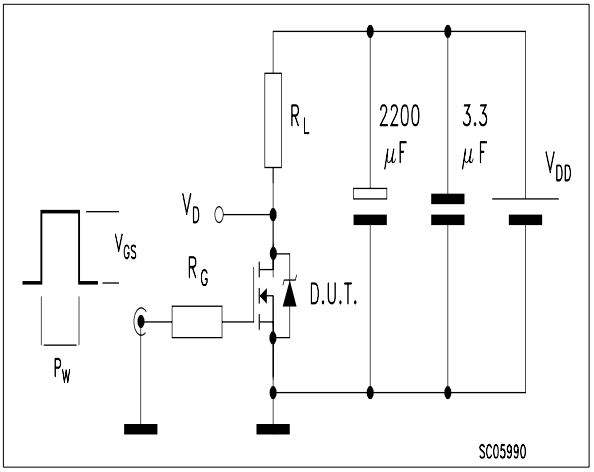


Fig. 4: Gate Charge test Circuit

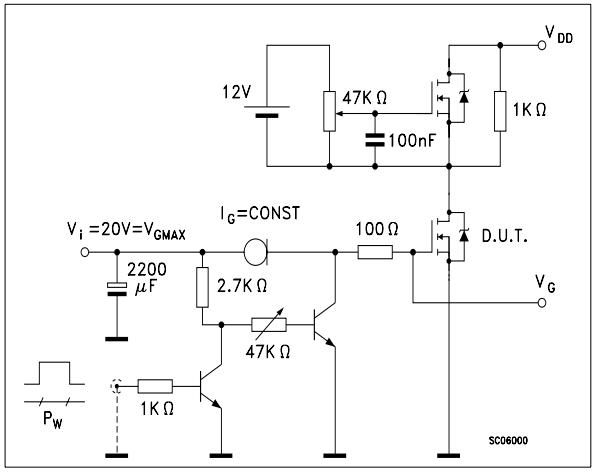
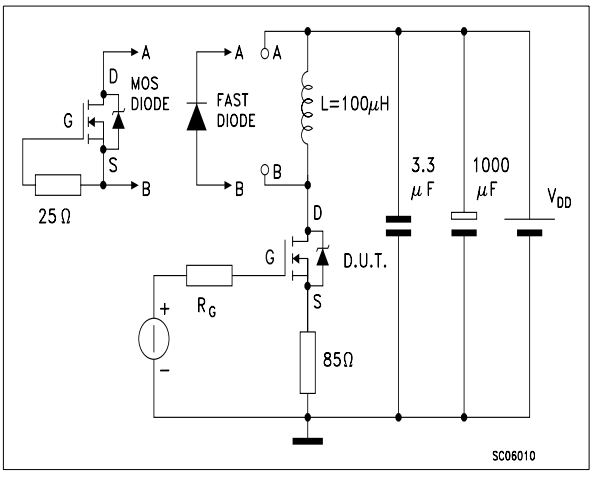
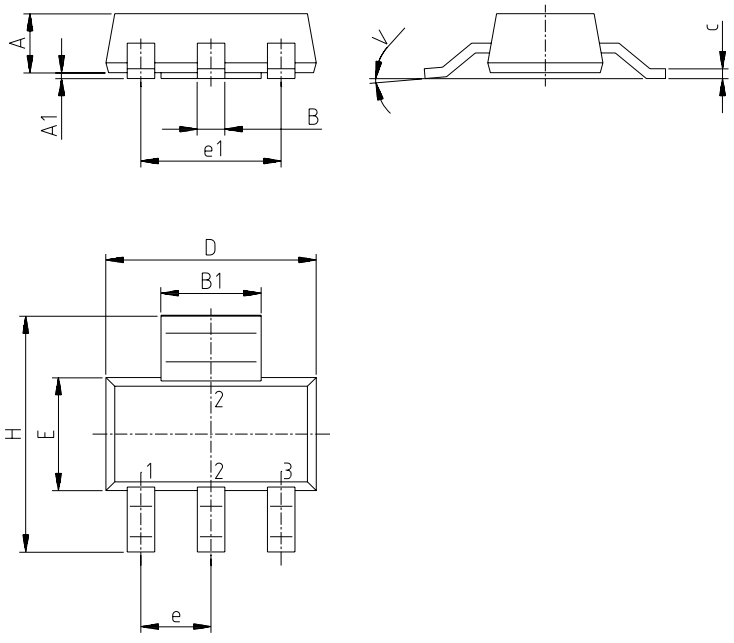


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



SOT-223 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.80			0.071
B	0.60	0.70	0.80	0.024	0.027	0.031
B1	2.90	3.00	3.10	0.114	0.118	0.122
c	0.24	0.26	0.32	0.009	0.010	0.013
D	6.30	6.50	6.70	0.248	0.256	0.264
e		2.30			0.090	
e1		4.60			0.181	
E	3.30	3.50	3.70	0.130	0.138	0.146
H	6.70	7.00	7.30	0.264	0.276	0.287
V			10^o			10^o
A1		0.02				



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