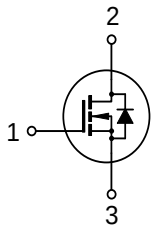
180A, 30V N-CHANNEL MOSFET

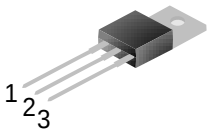
DESCRIPTION

The SVT033R5NAT is an N-channel enhancement mode power MOS field effect transistor which is produced using Silan's LVMOS technology. The improved process and cell structure have been especially tailored to minimize on-state resistance, provide superior switching performance.

This device is widely used in the fields of uninterruptible power supplies and power management of inverter systems.



1.Gate 2.Drain 3.Source



TO-220HW-3L

FEATURES

- 180A,30V,$R_{DS(on)(typ.)}$=2.8mΩ@V_{GS}=10V
- Low gate charge
- Low Crss
- Fast switching
- Improved dv/dt capability

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SVT033R5NAT	TO-220HW-3L	033R5NAT	Pb free	Tube

ABSOLUTE MAXIMUM RATINGS (UNLESS OTHERWISE NOTED,T_A=25°C)

Characteristics		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current	T_C=25°C	I_D	180	A
	T_C=100°C		114	
Drain Current Pulsed		I_{DM}	720	A
Power Dissipation (T_C=25°C)		P_D	171.2	W
-Derate above 25°C			1.14	W/°C
Single Pulsed Avalanche Energy (Note 1)		E_{AS}	404	mJ
Operation Junction Temperature Range		T_J	-55～+150	°C
Storage Temperature Range		T_{stg}	-55～+150	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.73	°C/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	°C/W

ELECTRICAL CHARACTERISTICS (UNLESS OTHERWISE NOTED,T_J=25°C)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	30	--	--	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=30V, V_{GS}=0V	--	--	1.0	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	--	--	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}= V_{DS}, I_D=250μA	1	--	3	V
Static Drain- Source On State Resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=50A	--	2.8	3.5	mΩ
		V_{GS}=4.5V, I_D=40A	--	5	6.5	mΩ
Gate Resistance	R_G	f=1MHz	--	2.8	--	Ω
Input Capacitance	C_{iss}	f=1MHz,V_{GS}=0V,V_{DS}=15V	--	5412	--	pF
Output Capacitance	C_{oss}		--	1011	--	
Reverse Transfer Capacitance	C_{rss}		--	642	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V, V_{GS}=10V, R_G= 6Ω, I_D=50A (Notes 2,3)	--	12	--	ns
Turn-on Rise Time	t_r		--	77	--	
Turn-off Delay Time	$t_{d(off)}$		--	309	--	
Turn-off Fall Time	t_f		--	194	--	
Total Gate Charge	Q_g	V_{DD}=24V, V_{GS}=10V, I_D=50A (Notes 2,3)	--	114	--	nC
Gate-Source Charge	Q_{gs}		--	15	--	
Gate-Drain Charge	Q_{gd}		--	25	--	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Continuous Source Current	I_S	Integral Reverse P-N Junction	--	--	180	A
Pulsed Source Current	I_{SM}	Diode in the MOSFET	--	--	720	
Diode Forward Voltage	V_{SD}	I_S=150A,V_{GS}=0V	--	--	1.4	V
Reverse Recovery Time	T_{rr}	I_S=25A,V_{GS}=0V,	--	52	--	ns
Reverse Recovery Charge	Q_{rr}	dIF/dt=100A/μs (Notes 2)	--	0.04	--	μC

Notes:

1.L=0.5mH, V_{DD}=24V, R_G=25Ω,starting T_J=25°C;

2.Pulse Test: Pulse width ≤300μs,Duty cycle≤2%;

3.Essentially independent of operating temperature.

TYPICAL CHARACTERISTICS

Figure 1. Output Characteristics

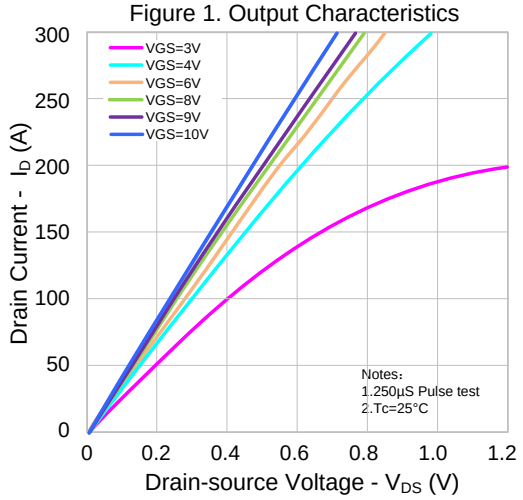


Figure 2. Transfer Characteristics

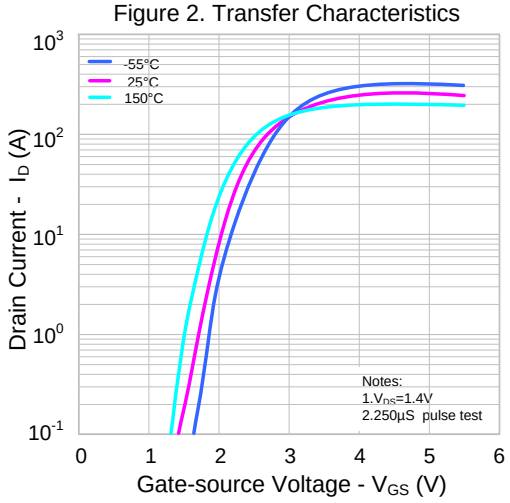


Figure 3. On-Resistance vs. Drain Current

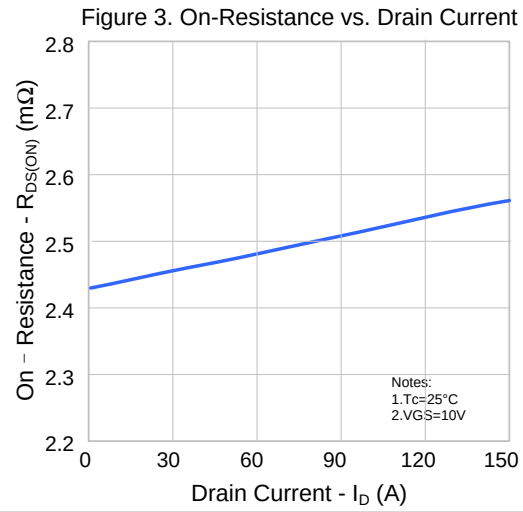


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

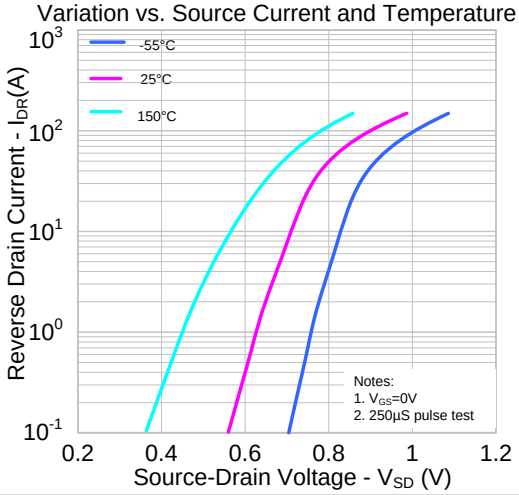


Figure 5. Capacitance Characteristics

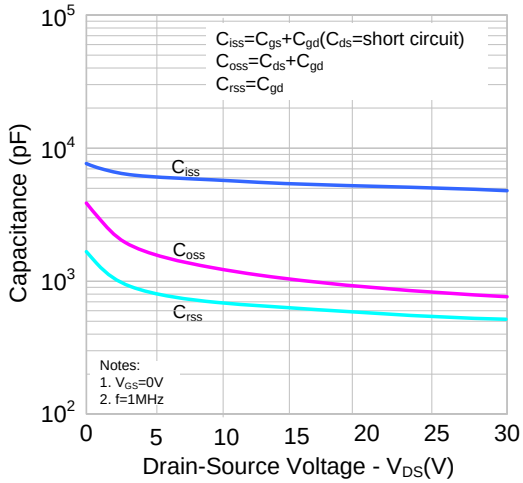
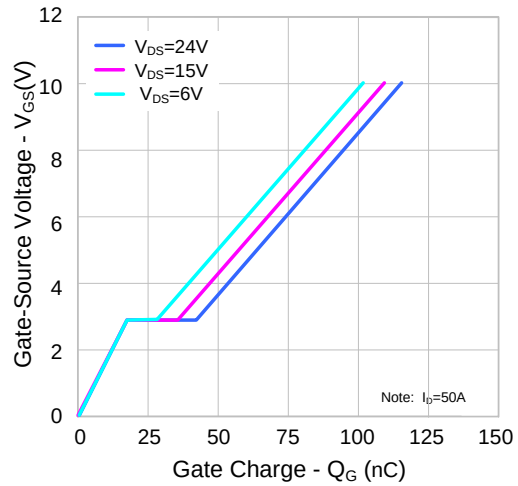


Figure 6. Gate Charge



TYPICAL CHARACTERISTICS (CONTINUED)

Figure 7. Breakdown Voltage vs. Temperature Characteristics

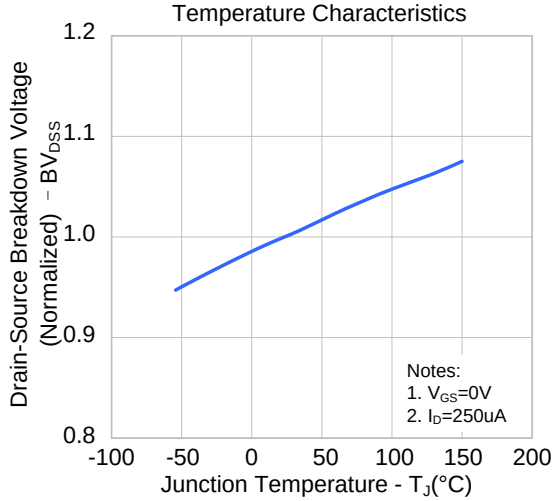


Figure 8. On-Resistance vs. Temperature Characteristics

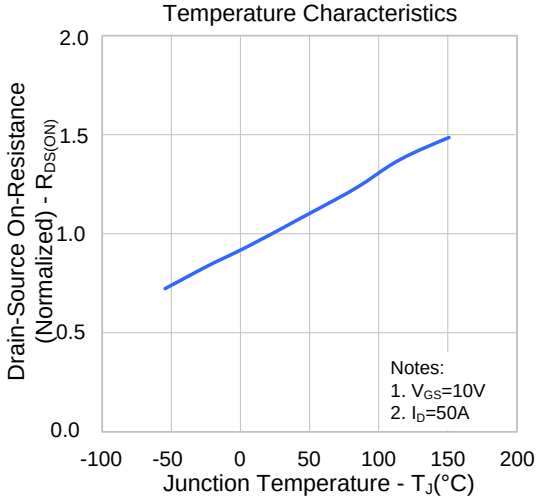
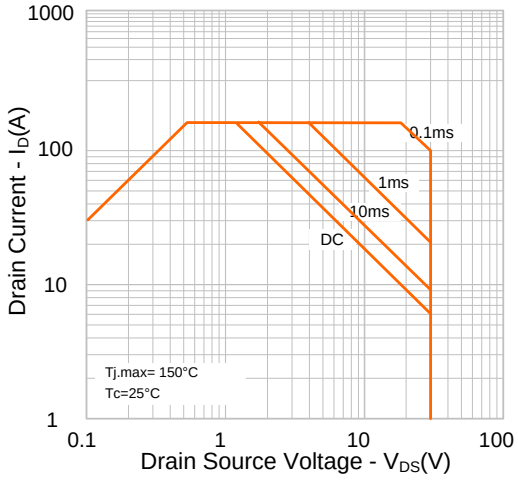
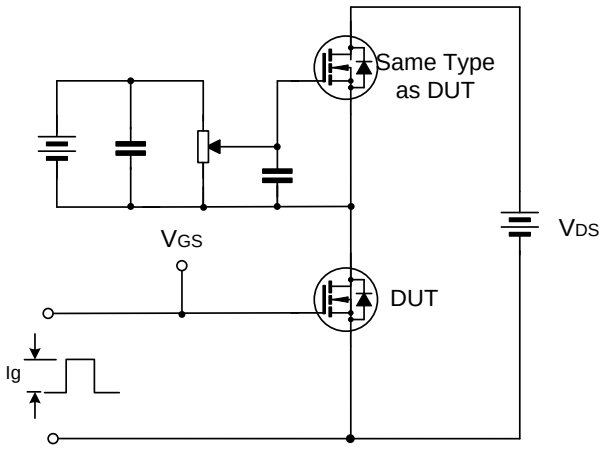


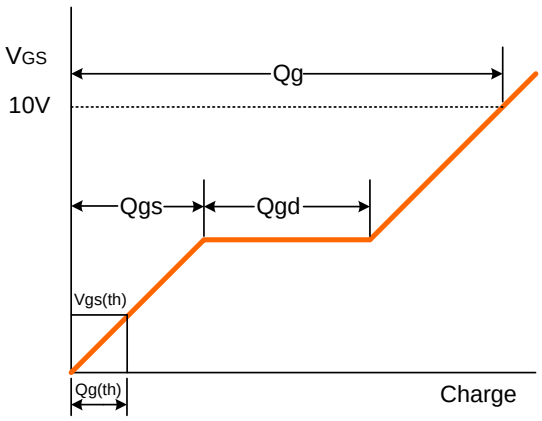
Figure 9. Max. Safe Operating Area



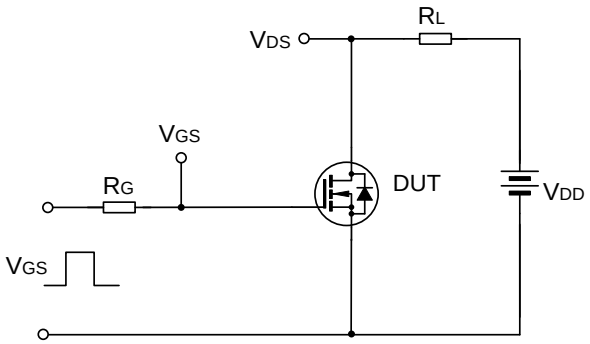
TYPICAL TEST CIRCUIT

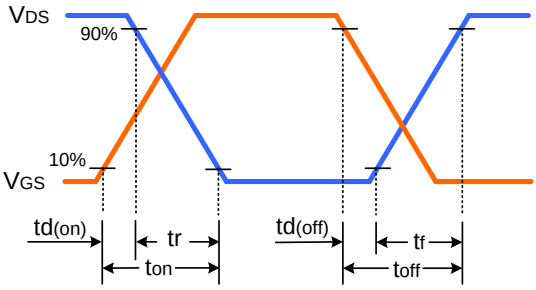
Gate Charge Test Circuit & Waveform



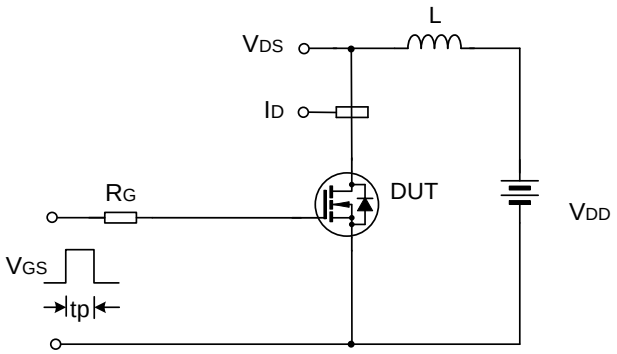


Resistive Switching Test Circuit & Waveform

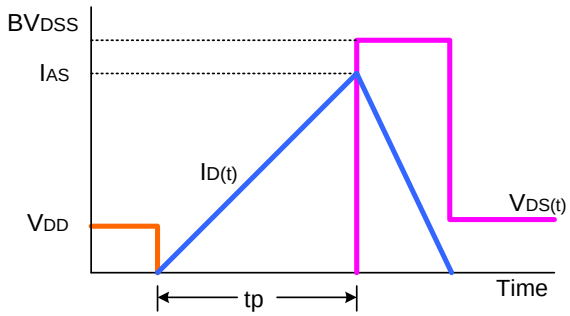




Unclamped Inductive Switching Test Circuit & Waveform

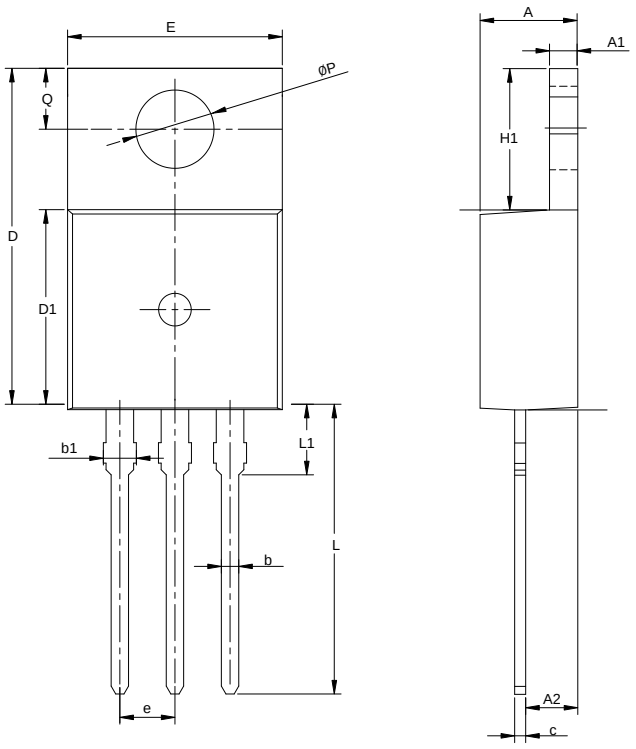


$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



PACKAGE OUTLINE

TO-220HW-3L **UNIT: mm**



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	4.30	4.50	4.77
A1	1.25	1.27	1.42
A2	1.80	2.50	2.89
b	0.70	0.80	0.96
b1	1.22	1.33	1.50
c	0.33	0.38	0.48
D	15.10	15.70	16.10
D1	8.80	9.15	9.40
E	9.60	10.20	10.40
e	2.54 BSC		
H1	6.10	6.50	7.00
L	12.60	13.10	14.30
L1	—	—	3.50
Q	2.54	—	2.94
ØP	3.66	3.86	4.06

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Rev.: 1.1

Revision History:

1. Update the template of the datasheet

Rev.: 1.0

Revision History:

1. First release