A 750 , 950 A

6 ™

950 75 4 B

SSDC33, 154.50x92.0 (SPB)
CASE 183AB

Product Description

The NVH950S75L4SPB is a power module from the VE−Trac™ Direct family of highly integrated power modules with industry standard footprints for Hybrid (HEV) and Electric Vehicle (EV) traction inverter application.

The module integrates six Field Stop 4 (FS4) 750 V Narrow Mesa IGBTs in a 6−pack configuration, which excels in providing high current density, while offering robust short circuit protection and increased blocking voltage. Additionally, FS4 750 V Narrow Mesa IGBTs show low power losses during lighter loads, which helps to improve overall system efficiency in automotive applications.

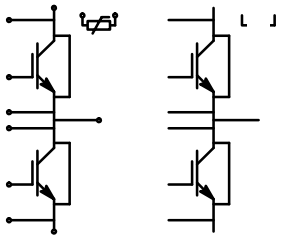
For assembly ease and reliability, a new generation of press−fit pins are integrated into the power module signal terminals. In addition, the power module has an optimized pin−fin heatsink in the baseplate.

Features

- Direct Cooling w/ Integrated Pin−fin Heatsink
- Ultra−low Stray Inductance
- T_{vjmax} = 175°C Continuous Operation
- Low V_{CESAT} and Switching Losses
- Automotive Grade FS4 750 V Narrow Mesa IGBT
- Fast Recovery Diode Chip Technologies
- 4.2 kV Isolated DBC Substrate
- Easy to Integrate 6−pack Topology
- This Device is Pb−Free and is RoHS Compliant

Typical Applications

- Hybrid and Electric Vehicle Traction Inverter
- High Power Converters



ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

Pin Description

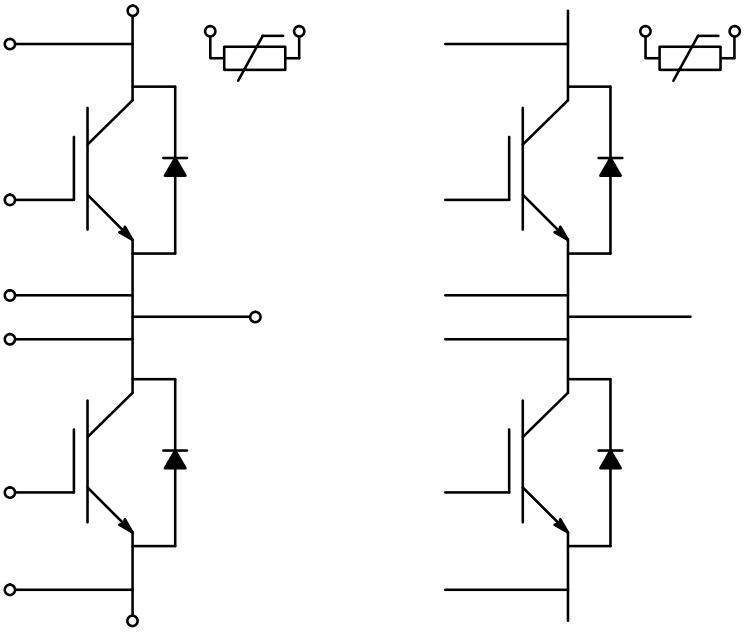


Figure 1. Pin Description

MODULE CHARACTERISTICS (T_{vj} = 25°C, Unless Otherwise Specified)

Symbol	Parameter	Rating	Unit
T_{vj}	Operating Junction Temperature	−40 to 175	°C
T_{STG}	Storage Temperature	−40 to 125	°C
V_{ISO}	Isolation Voltage (DC, 0 Hz, 1 s)	4200	V
L_{sCE}	Stray Inductance	8	nH
RCC'+EE'	Module Lead Resistance, Terminals − Chip	0.75	mΩ
G			

CHARACTERISTICS OF IGBT (T_{vj} = 25°C, Unless Otherwise Specified)

Symbol	Parameters	Conditions		Min	Typ	Max	Unit
V_{CESAT}	Collector to Emitter Saturation Voltage (Terminal)	V_{GE} = 15 V, I_C = 600 A	T_{vj} = 25°C	–	1.30	1.55	V
	Collector to Emitter Saturation Voltage (Chip)	V_{GE} = 15 V, I_C = 600 A	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	1.25 1.37 1.40	1.50 – –	
		V_{GE} = 15 V, I_C = 950 A	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	1.47 1.71 1.77	– – –	
I_{CES}	Collector to Emitter Leakage Current	V_{GE} = 0, V_{CE} = 750 V	T_{vj} = 25°C T_{vj} = 150°C	– –	– 2.0	500 –	µA mA
I_{GES}	Gate – Emitter Leakage Current	V_{CE} = 0, V_{GE} = ±20 V		–	–	±300	nA
V_{th}	Threshold Voltage	V_{CE} = V_{GE}, I_C = 90 mA		4.8	5.7	6.6	V
Q_G	Total Gate Charge	V_{GE} = −8 to 15 V, V_{CE} = 400 V		–	2.3	–	µC
R_{Gint}	Internal Gate Resistance			–	1.7	–	Ω
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 100 kHz		–	60	–	nF
C_{oes}	Output Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 100 kHz		–	1.90	–	nF
C_{res}	Reverse Transfer Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 100 kHz		–	0.2	–	nF
$T_{d.on}$	Turn On Delay, Inductive Load	I_C = 600 A, V_{CE} = 400 V, V_{GE} = +15/−8 V, $R_{g.on}$ = 4 Ω	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	315 320 322	– – –	ns
T_r	Rise Time, Inductive Load	I_C = 600 A, V_{CE} = 400 V, V_{GE} = +15/−8 V, $R_{g.on}$ = 4 Ω	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	108 127 132	– – –	ns
$T_{d.off}$	Turn Off Delay, Inductive Load	I_C = 600 A, V_{CE} = 400 V, V_{GE} = +15/−8 V, $R_{g.off}$ = 12 Ω	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	1063 1196 1203	– – –	ns
T_f	Fall Time, Inductive Load	I_C = 600 A, V_{CE} = 400 V, V_{GE} = +15/−8 V, $R_{g.off}$ = 12 Ω	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	– – –	85 144 151	– – –	ns
E_{ON}	Turn On Switching Loss (Including Diode Reverse Recovery Loss)	I_C = 600 A, V_{CE} = 400 V, V_{GE} = +15/−8 V, L_s = 22 nH, $R_{g.on}$ = 4 Ω	di/dt = 4.5 A/ns, T_{vj} = 25°C di/dt = 3.9 A/ns, T_{vj} = 150°C di/dt = 3.6 A/ns, T_{vj} = 175°C	– – –	26 36 38	– – –	mJ
E_{OFF}	Turn Off Switching Loss	I_C = 600 A, V_{CE} = 400 V, V_{GE}= +15/−8 V, L_s = 22 nH, $R_{g.off}$ = 12 Ω	dv/dt = 2.7 V/ns, T_{vj} = 25°C dv/dt = 1.9 V/ns, T_{vj} = 150°C dv/dt = 1.9 V/ns, T_{vj} = 175°C	– – –	33 46 50	– – –	mJ
E_{SC}	Minimum Short Circuit Energy Withstand	V_{GE} = 15 V, V_{CC} = 400 V	T_{vj} = 25°C T_{vj} = 175°C	9 4.5	– –	– –	J

CHARACTERISTICS OF INVERSE DIODE (T_{vj} = 25°C, Unless Otherwise Specified)

Symbol	Parameters	Conditions		Min	Typ	Max	Unit
V_F	Diode Forward Voltage (Terminal)	I_F = 600 A	T_{vj} = 25°C	−	1.70	1.95	V
	Diode Forward Voltage (Chip)	I_F = 600 A	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	− − −	1.60 1.55 1.50	1.85 − −	
		I_F = 950 A	T_{vj} = 25°C T_{vj} = 150°C T_{vj} = 175°C	− − −	1.73 1.75 1.74	− − −	
E_{rr}	Reverse Recovery Energy	I_F = 600 A, V_R = 400 V, V					

TYPICAL CHARACTERISTICS

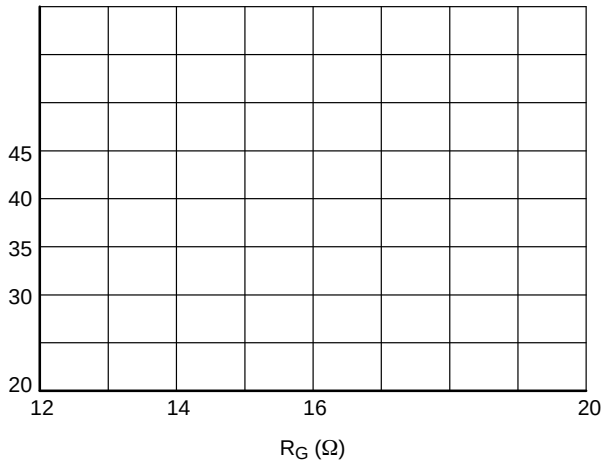


Figure 8. E_{OFF} vs. R_G

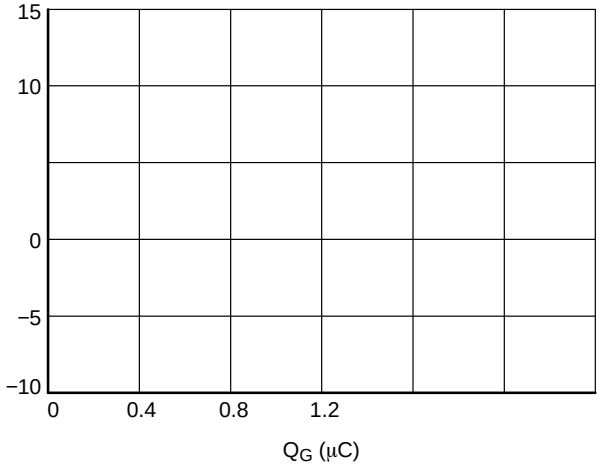


Figure 9. Gate Charge Characteristic

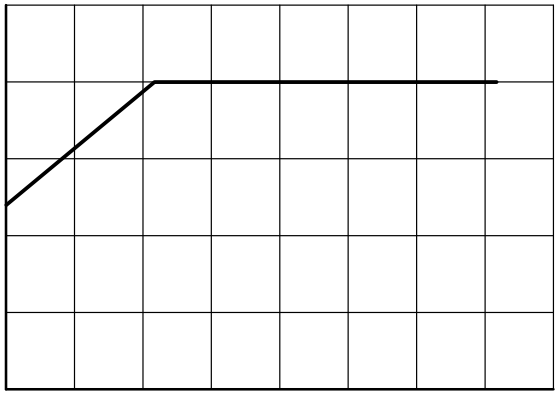


Figure 10. Maximum Allowed V_{CE}

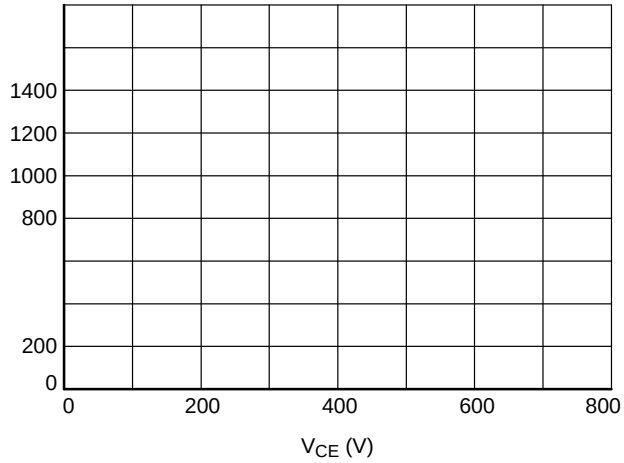
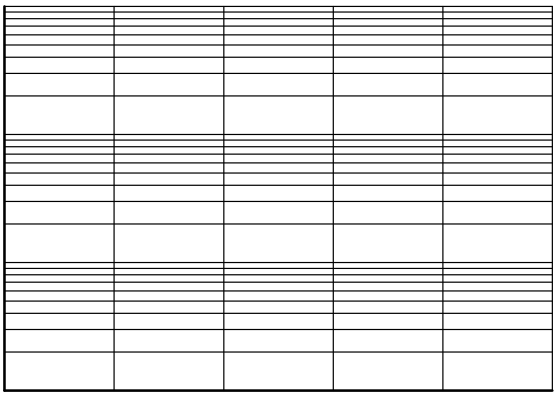
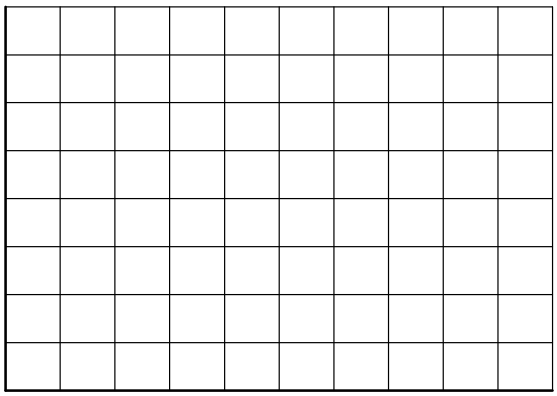
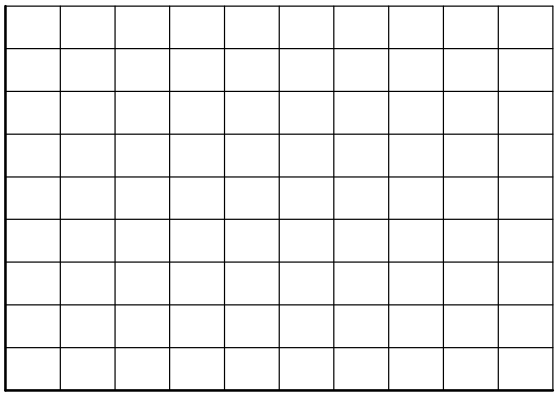


Figure 11. Reverse Bias Safe Operating Area





TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS

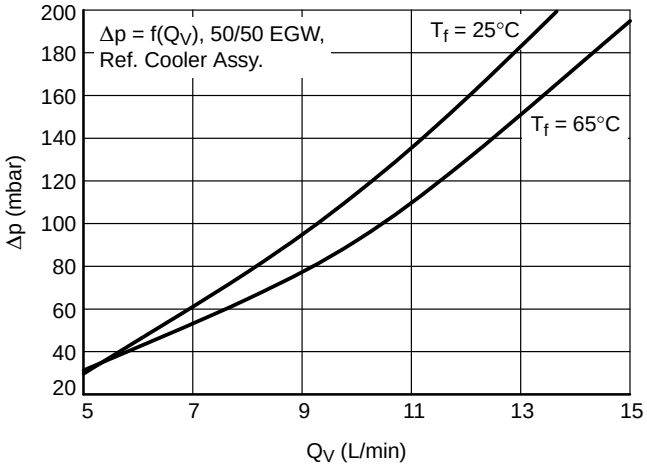


Figure 20. Pressure Drop in Cooling Circuit

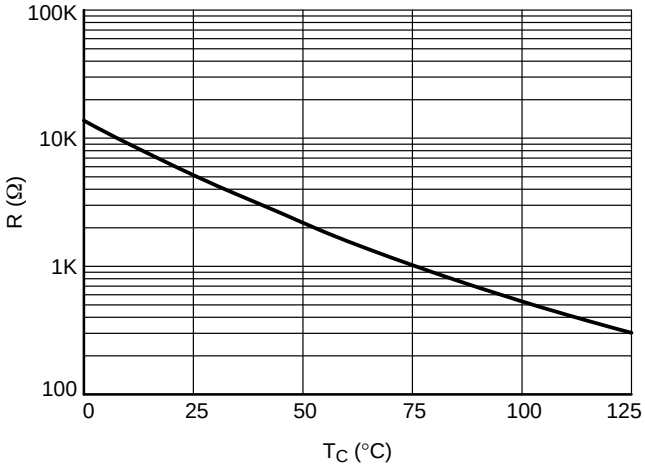


Figure 21. NTC Thermistor − Temperature Characteristic (Typ.)

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ISSUE A

DATE 05 DEC 2019

XXXXX = Specific Device Code
G = Pb−Free Package
AT = Assembly & Test Site Code

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