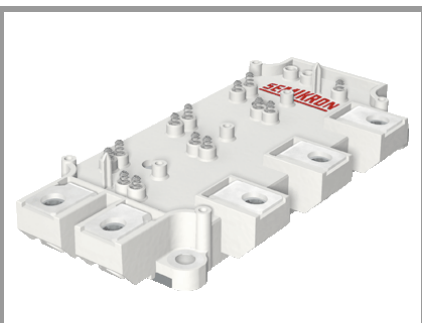


# SEMiX151GD066HDs



SEMiX<sup>®</sup>13

## Trench IGBT Modules

SEMiX151GD066HDs

Preliminary Data

### Features

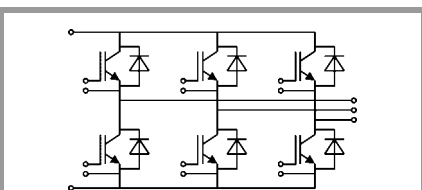
- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$  with positive temperature coefficient
- UL recognised file no. E63532

### Typical Applications

- Matrix Converter
- Resonant Inverter
- Current Source Inverter

### Remarks

- Case temperature limited to  $T_C=125^\circ\text{C}$  max.
- Product reliability results are valid for  $T_j=150^\circ\text{C}$
- For short circuit: Soft  $R_{Goff}$  recommended
- Take care of over-voltage caused by stray inductance



GD

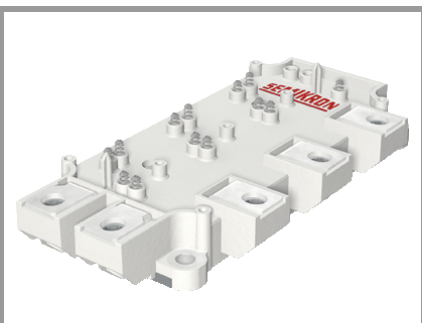
## Absolute Maximum Ratings

Symbol	Conditions	Values	Unit	
<b>IGBT</b>				
$V_{CES}$		600	V	
$I_C$	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	201	A
		$T_c = 80^\circ\text{C}$	152	A
$I_{Cnom}$		150	A	
$I_{CRM}$	$I_{CRM} = 2 \times I_{Cnom}$	300	A	
$V_{GES}$		-20 ... 20	V	
$t_{psc}$	$V_{CC} = 360\text{ V}$ $V_{GE} \leq 15\text{ V}$ $T_j = 150^\circ\text{C}$ $V_{CES} \leq 600\text{ V}$	6	$\mu\text{s}$	
$T_j$		-40 ... 175	$^\circ\text{C}$	
<b>Inverse diode</b>				
$I_F$	$T_j = 175^\circ\text{C}$	$T_c = 25^\circ\text{C}$	219	A
		$T_c = 80^\circ\text{C}$	161	A
$I_{Fnom}$		150	A	
$I_{FRM}$	$I_{FRM} = 2 \times I_{Fnom}$	300	A	
$I_{FSM}$	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25^\circ\text{C}$	980	A	
$T_j$		-40 ... 175	$^\circ\text{C}$	
<b>Module</b>				
$I_{t(RMS)}$		600	A	
$T_{stg}$		-40 ... 125	$^\circ\text{C}$	
$V_{isol}$	AC sinus 50Hz, $t = 1\text{ min}$	4000	V	

## Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
<b>IGBT</b>					
$V_{CE(sat)}$	$I_C = 150\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$	1.45	1.9	V
		$T_j = 150^\circ\text{C}$	1.70	2.1	V
$V_{CE0}$		$T_j = 25^\circ\text{C}$	0.9	1	V
		$T_j = 150^\circ\text{C}$	0.85	0.9	V
$r_{CE}$	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	3.7	6.0	$\text{m}\Omega$
		$T_j = 150^\circ\text{C}$	5.7	8.0	$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C = 2.4\text{ mA}$	5	5.8	6.5	V
$I_{CES}$	$V_{GE} = 0\text{ V}$ $V_{CE} = 600\text{ V}$	$T_j = 25^\circ\text{C}$	0.15	0.45	$\text{mA}$
		$T_j = 150^\circ\text{C}$			$\text{mA}$
$C_{ies}$	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	9.2		nF
$C_{oes}$		$f = 1\text{ MHz}$	0.58		nF
$C_{res}$		$f = 1\text{ MHz}$	0.27		nF
$Q_G$	$V_{GE} = -8\text{ V...} + 15\text{ V}$		1200		nC
$R_{Gint}$	$T_j = 25^\circ\text{C}$		2.00		$\Omega$
$t_{d(on)}$	$V_{CC} = 300\text{ V}$		140		ns
$t_r$	$I_C = 150\text{ A}$		40		ns
$E_{on}$	$T_j = 150^\circ\text{C}$		3.8		mJ
$t_{d(off)}$	$R_{Gon} = 4.5\ \Omega$		385		ns
$t_f$	$R_{Goff} = 4.5\ \Omega$		40		ns
$E_{off}$			6.1		mJ
$R_{th(j-c)}$	per IGBT			0.29	K/W
$R_{th(j-s)}$	per IGBT				K/W

# SEMiX151GD066HDs



SEMiX<sup>®</sup>13

## Trench IGBT Modules

SEMiX151GD066HDs

Preliminary Data

### Features

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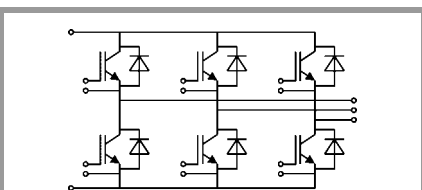
### Typical Applications

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### Remarks

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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
<b>Inverse diode</b>						
$V_F = V_{EC}$	$I_F = 150\text{ A}$ $V_{GE} = 0\text{ V}$ chipelevel	$T_j = 25^\circ\text{C}$		1.4	1.6	V
		$T_j = 150^\circ\text{C}$		1.4	1.6	V
$V_{F0}$		$T_j = 25^\circ\text{C}$	0.9	1	1.1	V
		$T_j = 150^\circ\text{C}$	0.75	0.85	0.95	V
$r_F$		$T_j = 25^\circ\text{C}$	2.0	2.7	3.3	m $\Omega$
		$T_j = 150^\circ\text{C}$	3.0	3.7	4.3	m $\Omega$
$I_{RRM}$	$I_F = 150\text{ A}$ $di/dt_{off} = 3000\text{ A}/\mu\text{s}$ $V_{GE} = -8\text{ V}$ $V_{CC} = 300\text{ V}$	$T_j = 150^\circ\text{C}$		155		A
$Q_{rr}$		$T_j = 150^\circ\text{C}$		24		$\mu\text{C}$
$E_{rr}$		$T_j = 150^\circ\text{C}$		5.8		
$R_{th(j-c)}$	per diode				0.36	K/W
$R_{th(j-s)}$	per diode					K/W
<b>Module</b>						
$L_{CE}$				20		nH
$R_{CC+EE}$	res., terminal-chip	$T_C = 25^\circ\text{C}$		0.7		m $\Omega$
		$T_C = 125^\circ\text{C}$		1		m $\Omega$
$R_{th(c-s)}$	per module			0.04		K/W
$M_s$	to heat sink (M5)		3		5	Nm
$M_t$		to terminals (M6)	2.5		5	Nm
						Nm
$w$					350	g
<b>Temperature sensor</b>						
$R_{100}$	$T_C=100^\circ\text{C}$ ( $R_{25}=5\text{ k}\Omega$ )			0,493 $\pm 5\%$		k $\Omega$
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$ ; $T[\text{K}]$ ;			3550 $\pm 2\%$		K



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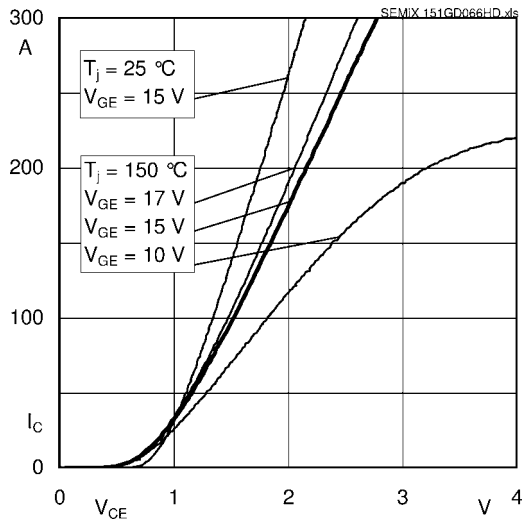


Fig. 1 Typ. output characteristic, inclusive  $R_{CC'+EE'}$

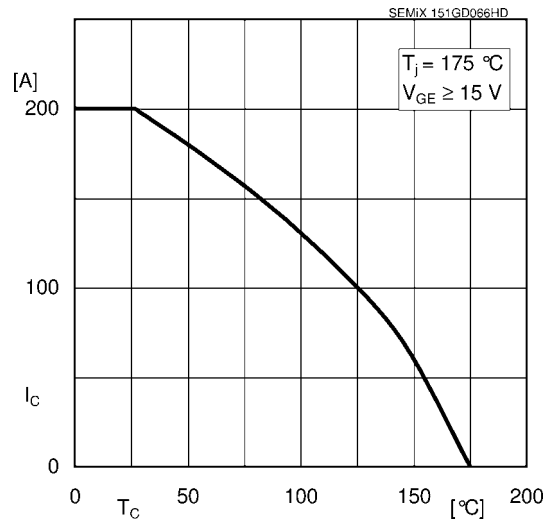


Fig. 2 Rated current vs. temperature  $I_C = f(T_C)$

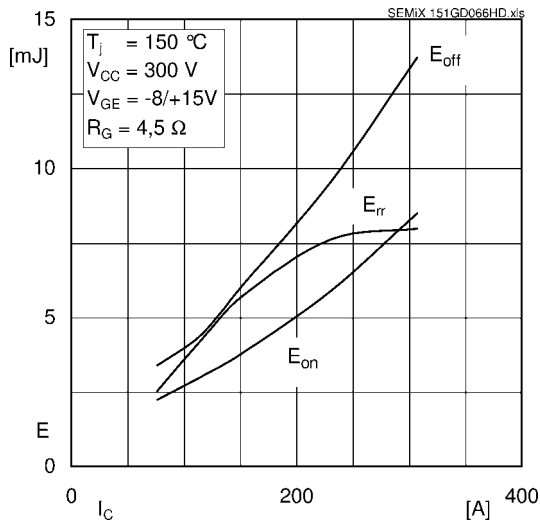


Fig. 3 Typ. turn-on /-off energy =  $f(I_C)$

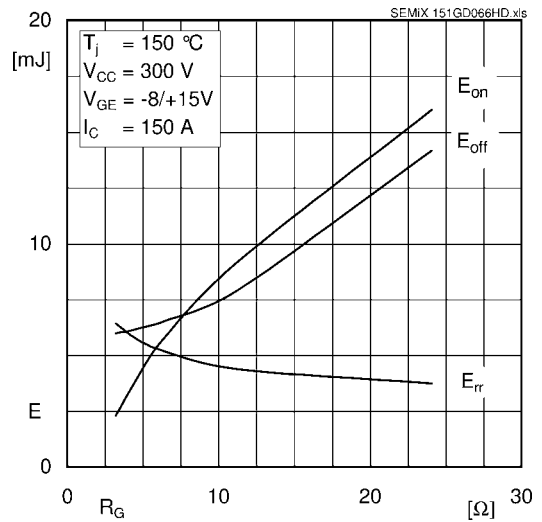


Fig. 4 Typ. turn-on /-off energy =  $f(R_G)$

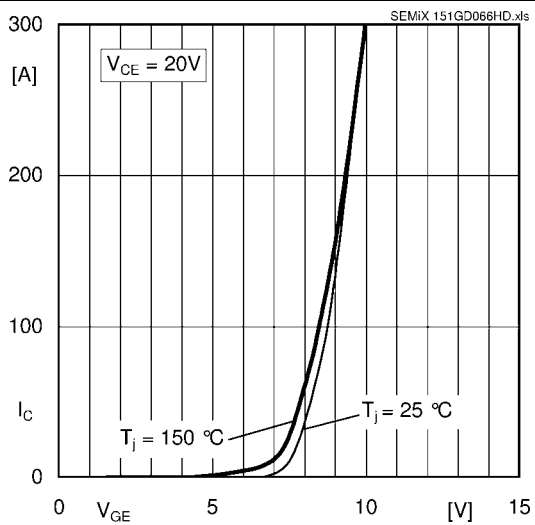


Fig. 5 Typ. transfer characteristic

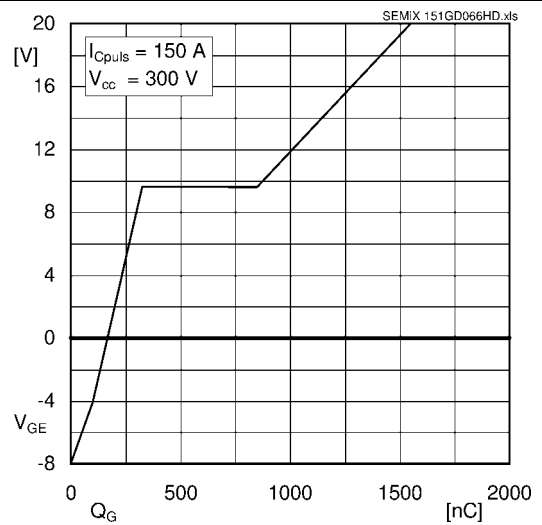
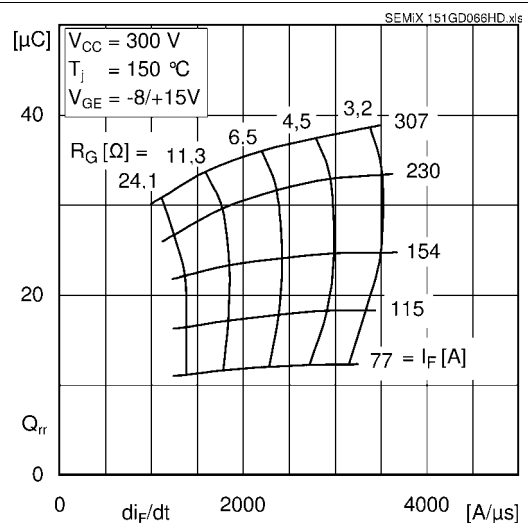
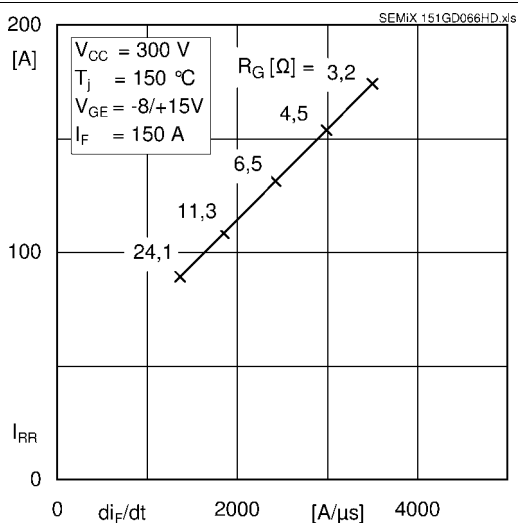
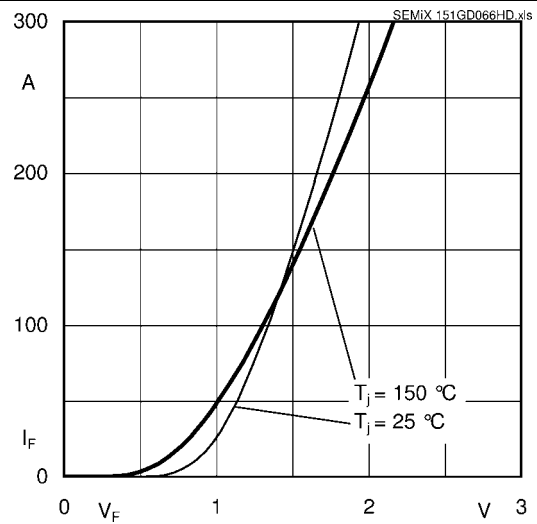
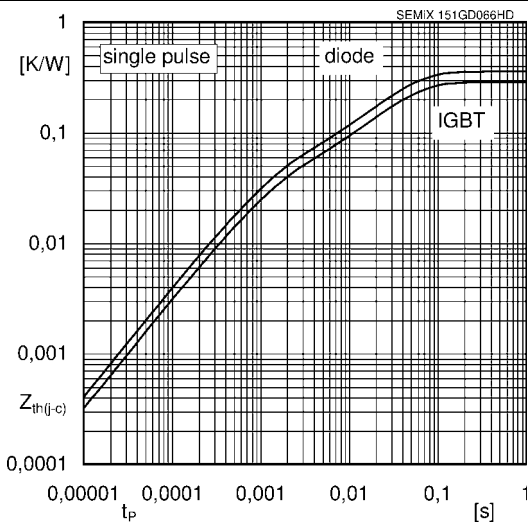
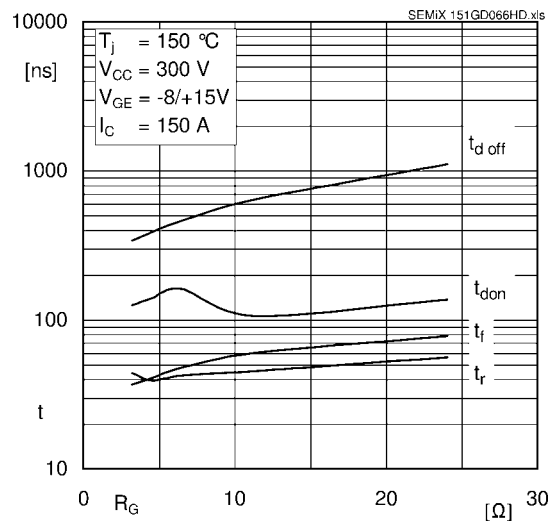
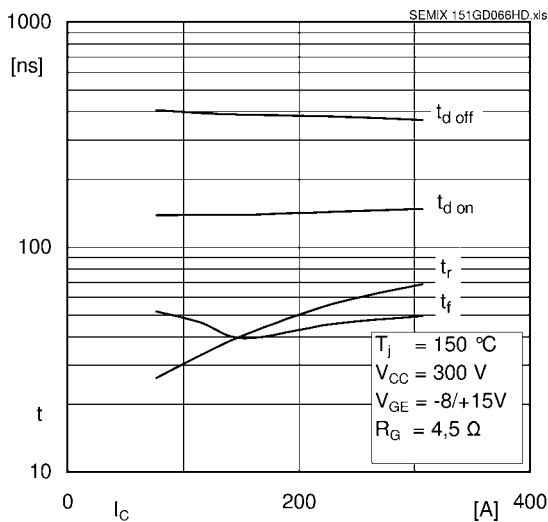


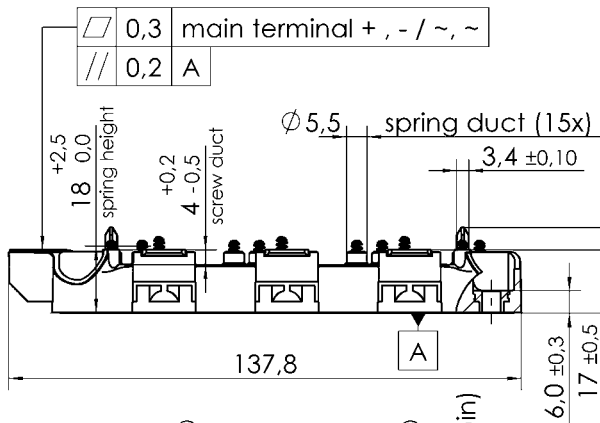
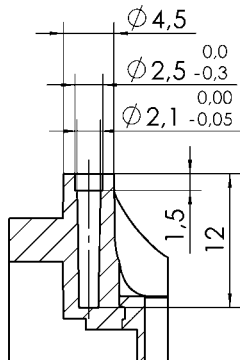
Fig. 6 Typ. gate charge characteristic



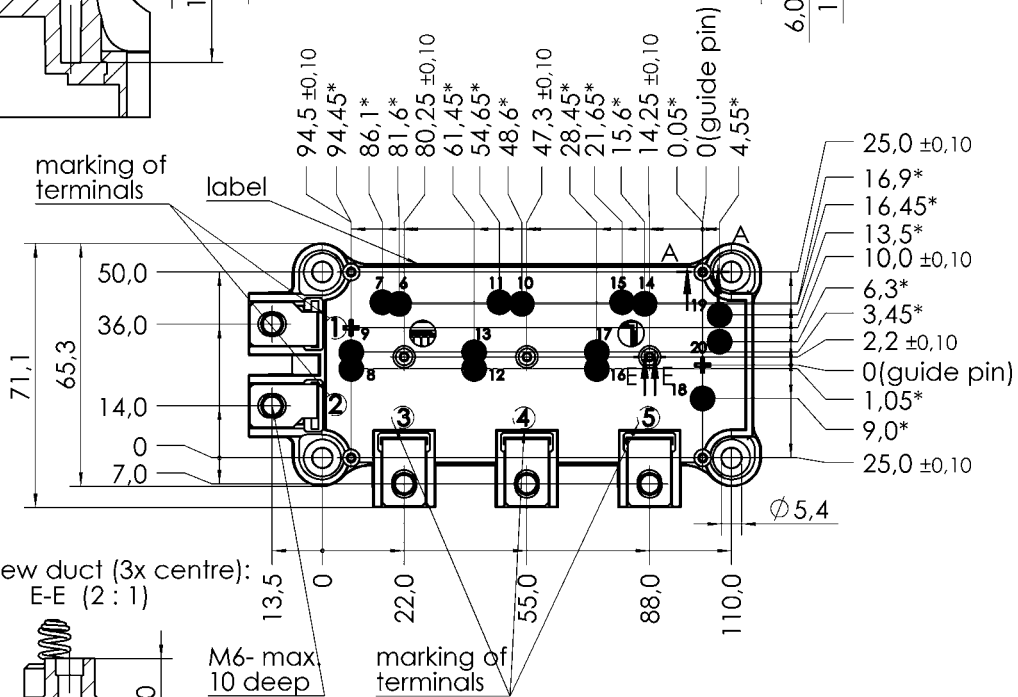
# SEMiX151GD066HDs

case: SEMiX 13

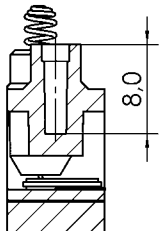
screw duct (4x):  
A-A (2:1)



All measures in Z-direction  
valid as mounted to heat sink



screw duct (3x centre):  
E-E (2:1)



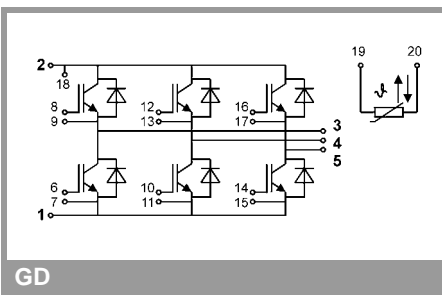
M6-max  
10 deep

marking of  
terminals

\* all measures with  $\pm 0,2$

Rules for the contact PCB:  
- spring landing pad =  $\varnothing 3,5 \pm 0,2$   
- holes guidepins =  $\varnothing 4 \pm 0,1$

SEMIX 13



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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.