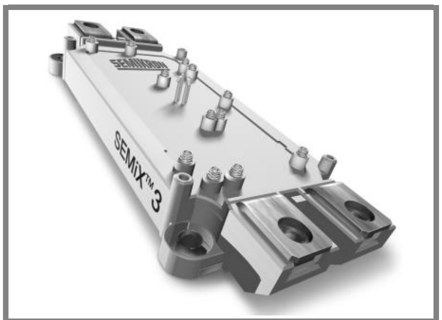


SEMiX® 3s

Trench IGBT Modules

SEMiX 653GB176HDs

Preliminary Data

Features

- Homogeneous Si
- Trench = Trenchgate technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability
- Released for Sn-Pb and Ni-Au PCB surfaces

Typical Applications

- AC inverter drives
- UPS
- Electronic welders

GB

Absolute Maximum Ratings		T_c = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**Values**	**Units**
IGBT			
V_{CES}		1700	V
I_C	T_c = 25 (80) °C	650 (460)	A
I_{CRM}	t_p = 1 ms	900	A
V_{GES}		± 20	V
T_{vj}, (T_{stg})	$T_{OPERATION} \leq T_{stg}$	- 40 ... + 150 (125)	°C
V_{isol}	AC, 1 min.	4000	V
Inverse diode			
I_F	T_c = 25 (80) °C	500 (340)	A
I_{FRM}	t_p = 1 ms	900	A
I_{FSM}	t_p = 10 ms; sin.; T_j = 150 °C	2900	A

Characteristics				T_c = 25 °C, unless otherwise specified	
Symbol	**Conditions**	**min.**	**typ.**	**max.**	**Units**
IGBT					
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 18 mA	5,2	5,8	6,4	V
I_{CES}	V_{GE} = 0, $V_{CE} = V_{CES}$, T_j = 25 () °C			0,45	mA
$V_{CE(TO)}$	T_j = 25 (125) °C		1 (0,9)	1,2 (1,1)	V
r_{CE}	V_{GE} = 0 V, T_j = 25 (125) °C		2,2 (3,4)	2,8 (4)	mΩ
$V_{CE(sat)}$	I_{Cnom} = 450 A, V_{GE} = 15 V, T_j = 25 (125) °C, chip level		2 (2,45)	2,45 (2,9)	V
C_{ies}	under following conditions		40		nF
C_{oes}	V_{GE} = 0, V_{CE} = 25 V, f = 1 MHz		1,7		nF
C_{res}			1,3		nF
L_{CE}			20		nH
$R_{CC'+EE'}$	terminal-chip, T_c= 25 (125) °C		0,7 (1)		mΩ
$t_{d(on)}/t_r$	V_{CC} = 1200 V, I_{Cnom} = 450 A		290 / 90		ns
$t_{d(off)}/t_f$	V_{GE} = ± 15 V		975 / 190		ns
E_{on} (E_{off})	$R_{Gon} = R_{Goff}$ = 3,6 Ω, T_j = 125 °C		285 (170)		mJ
Inverse diode					
$V_F = V_{EC}$	I_{Fnom} = 450 A; V_{GE} = 0 V; T_j = 25 (125) °C, chip level		1,7 (1,8)	2 (2,1)	V
$V_{(TO)}$	T_j = 25 (125) °C		1,1 (0,9)	1,3 (1,1)	V
r_T	T_j = 25 (125) °C		1,3 (2)	1,6 (2,2)	mΩ
I_{RRM}	I_{Fnom} = 450 A; T_j = 25 (125) °C		(380)		A
Q_{rr}	di/dt = 4200 A/µs		(130)		µC
E_{rr}	V_{GE} = -15 V		(73)		mJ
Thermal characteristics					
$R_{th(j-c)}$	per IGBT			0,05	K/W
$R_{th(j-c)D}$	per Inverse Diode			0,11	K/W
$R_{th(j-c)FD}$	per FWD				K/W
$R_{th(c-s)}$	per module		0,04		K/W
Temperature sensor					
R_{25}	T_c = 25 °C		5 ±5%		kΩ
$B_{25/85}$	$R_2=R_1\exp[B(1/T_2-1/T_1)]$; T[K];B		3420		K
Mechanical data					
M_s/M_t	to heatsink (M5) / for terminals (M6)	3/2,5		5 /5	Nm
w			289		g

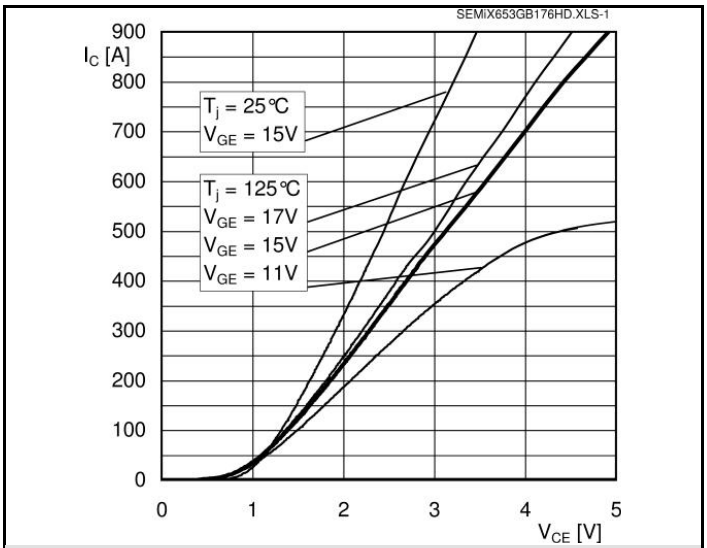


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

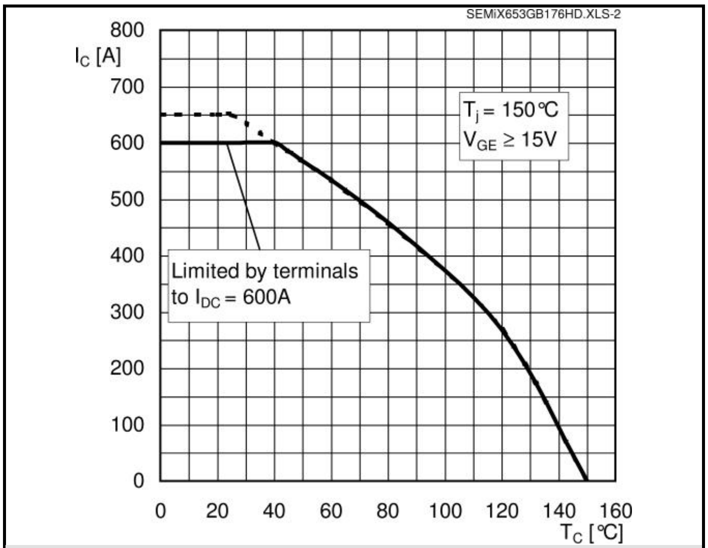


Fig. 2 Rated current vs. temperature $I_C = f (T_C)$

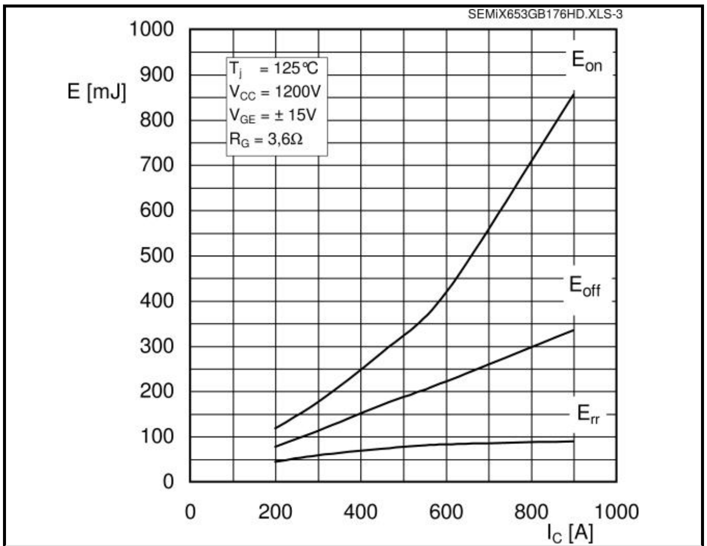


Fig. 3 Typ. turn-on /-off energy = f (I_C)

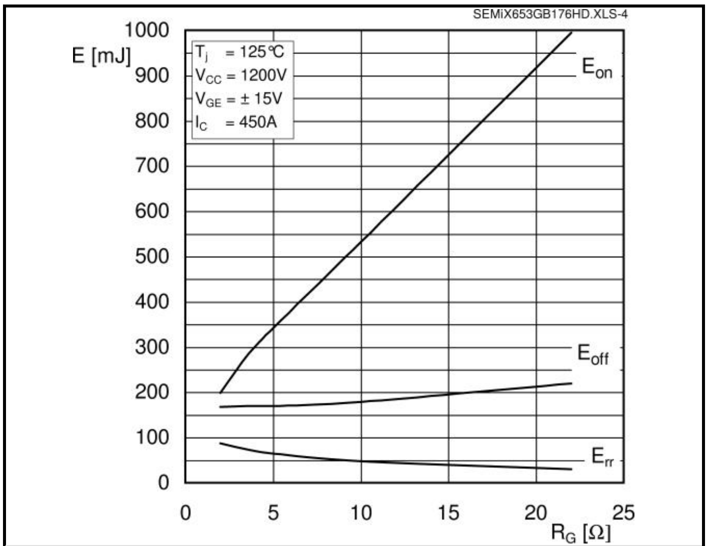


Fig. 4 Typ. turn-on /-off energy = f (R_G)

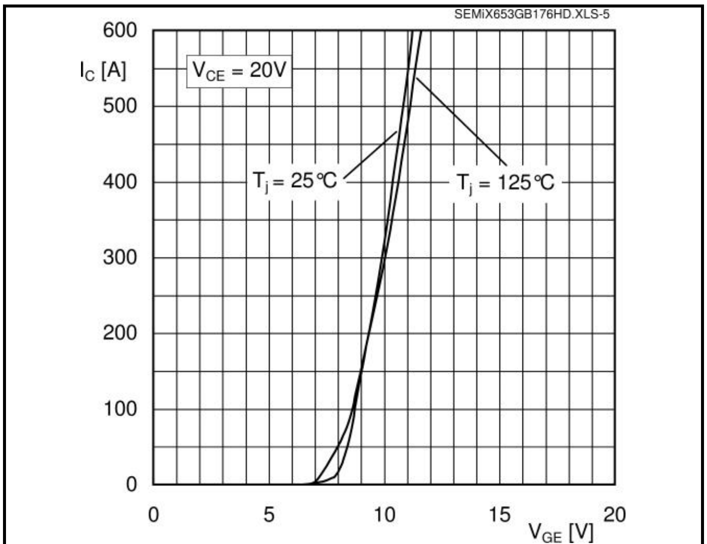


Fig. 5 Typ. transfer characteristic

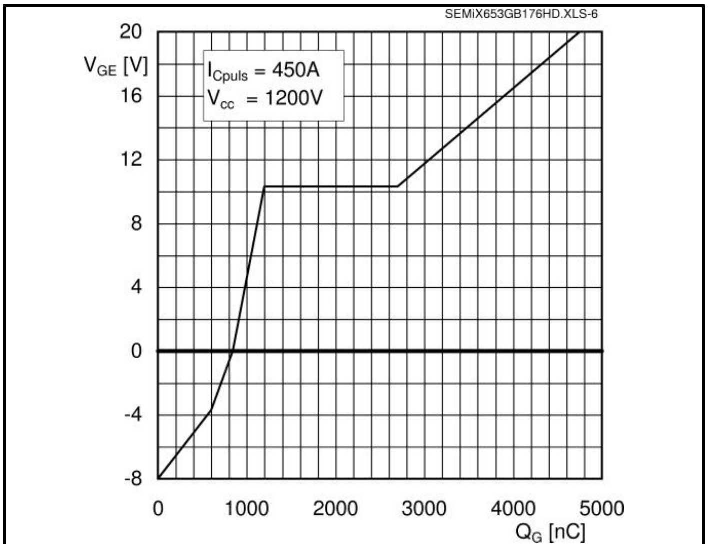


Fig. 6 Typ. gate charge characteristic

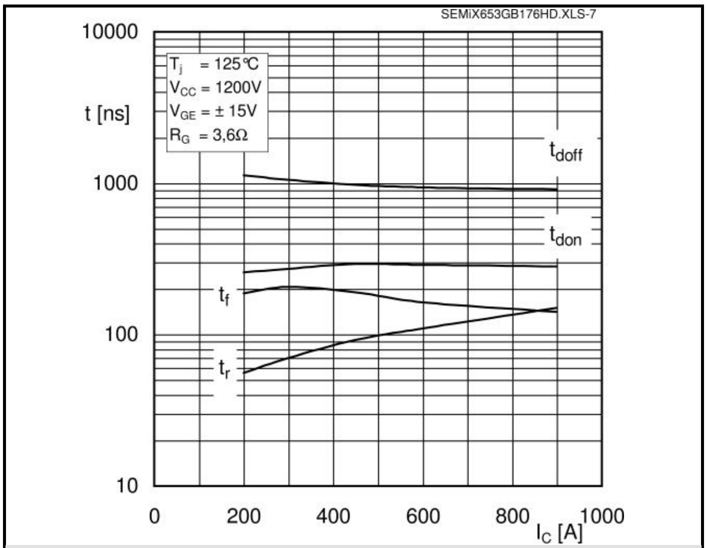


Fig. 7 Typ. switching times vs. I_C

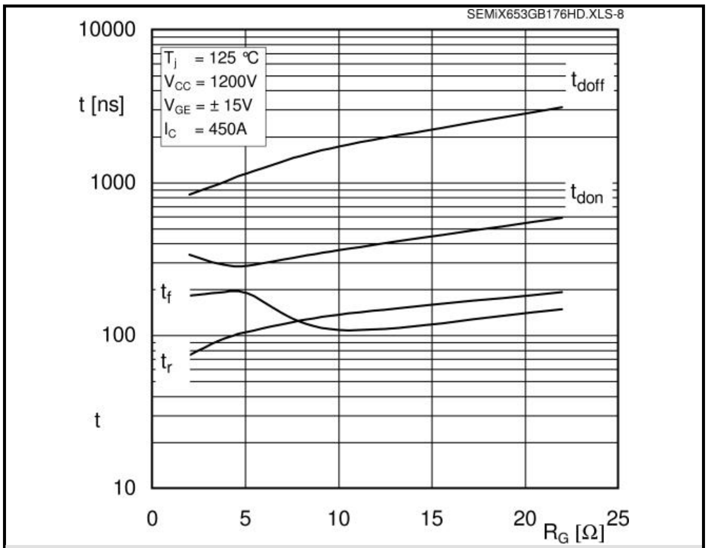


Fig. 8 Typ. switching times vs. gate resistor R_G

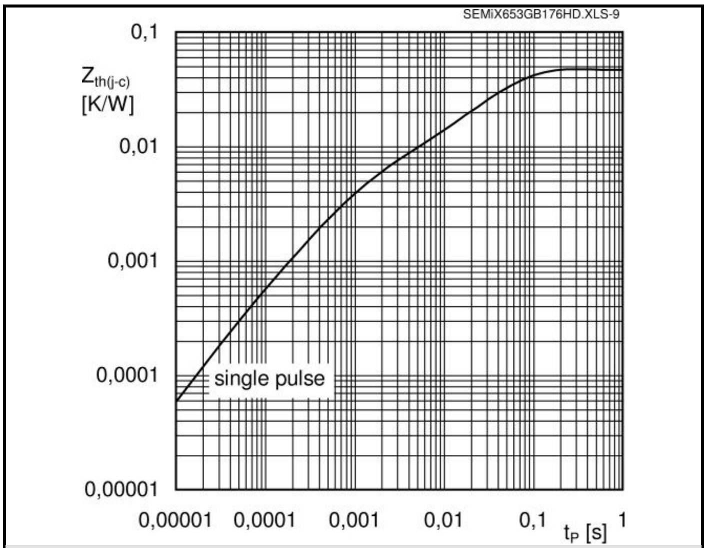


Fig. 9 Transient thermal impedance of IGBT

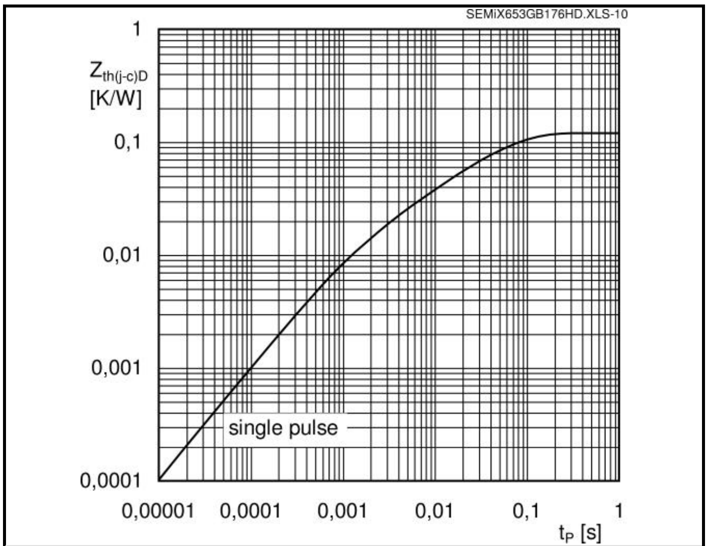


Fig. 10 Transient thermal impedance of FWD

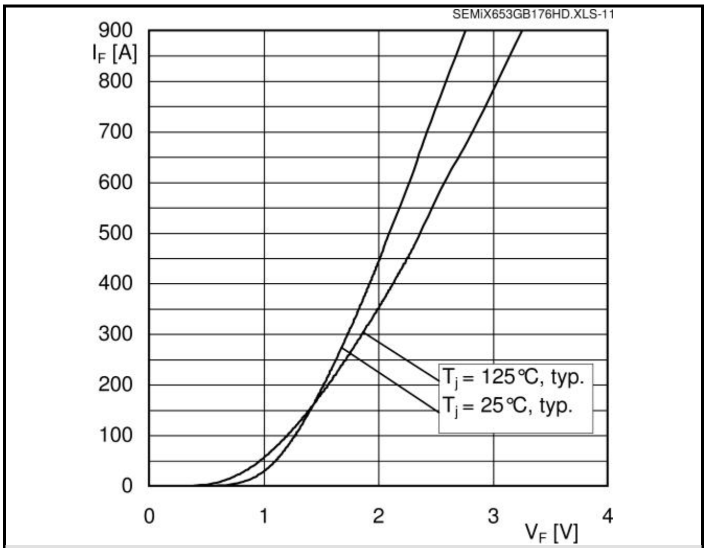


Fig. 11 Typ. CAL diode forward characteristic

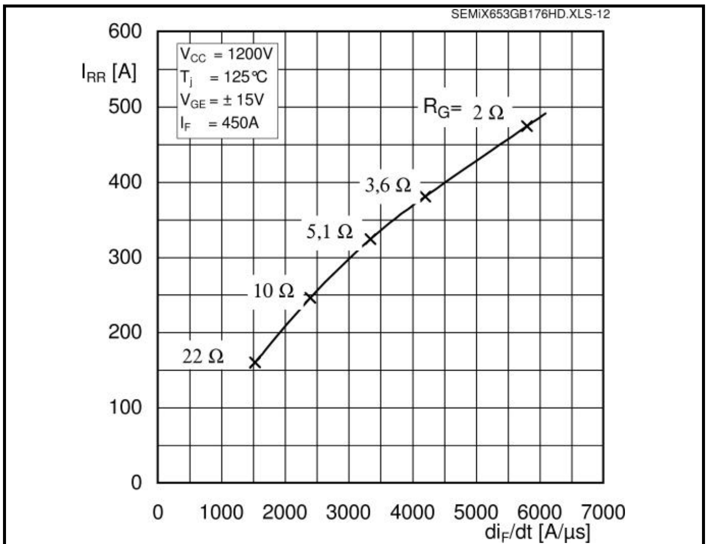


Fig. 12 Typ. CAL diode peak reverse recovery current

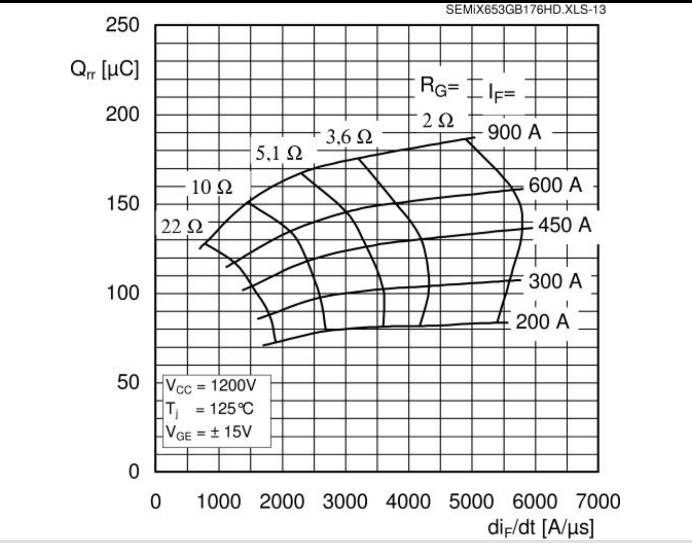
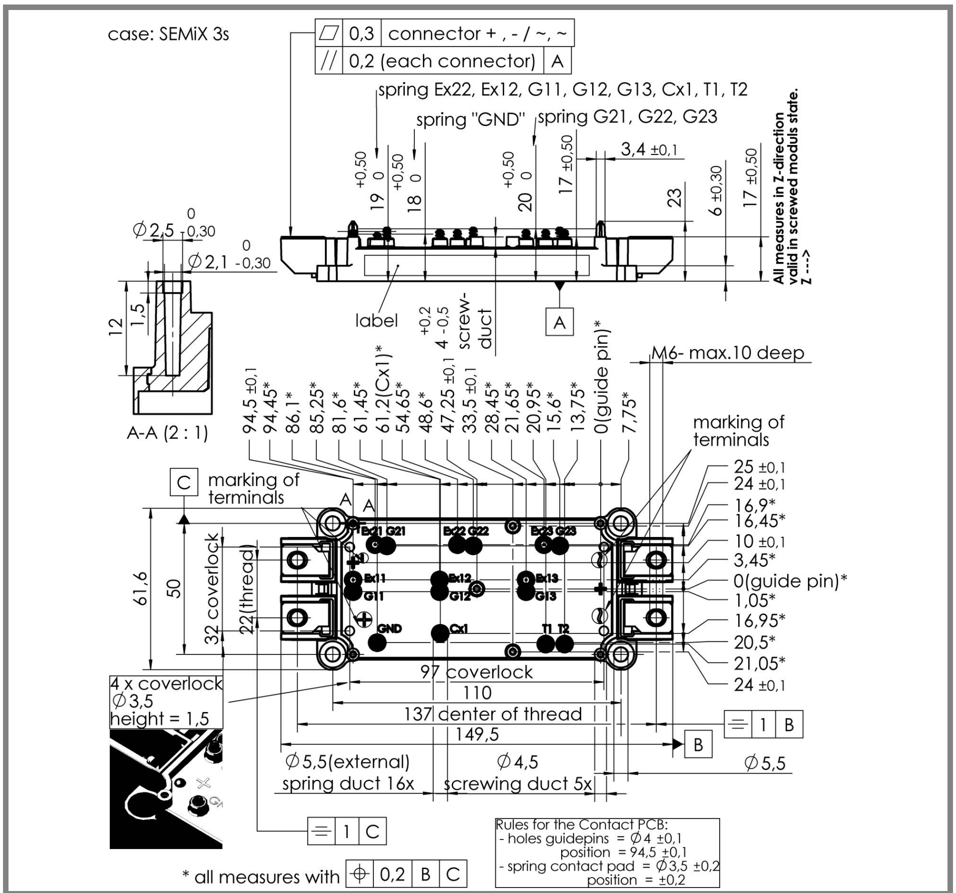


Fig. 13 Typ. CAL diode recovered charge



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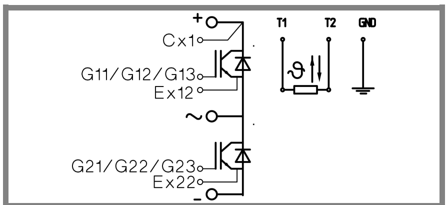

GB Case SEMiX 3s

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

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