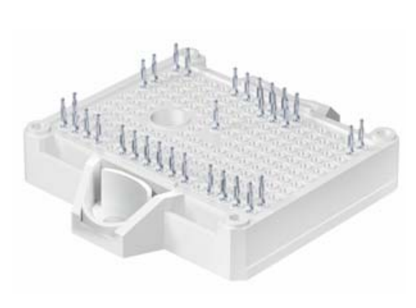
SK150MB120CR03TE2



SEMITOP®E2

Half-Bridge (Full SiC)

Engineering Sample

SK150MB120CR03TE2

Target Data

Features*

- Optimized design for superior thermal performance
- Extremely low inductance design
- Press-Fit contact technology
- 1200V Planar Gen3 SiC MOS
- Simple to drive with +15V gate voltage
- Integrated NTC temperature sensor
- UL recognized file no. E 63 532

Typical Applications

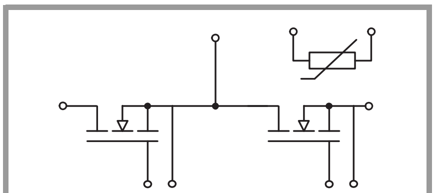
- Switched Mode Power Supplies
- Energy Storage Systems
- Electric Vehicle charging
- UPS
- Solar
- Motor Drives

Remarks

- Recommended $T_{j,op}$=-40 ...+150 °C
- Recommended turn-off / turn-on gate voltage V_{GS} = -4...0/+15V

Footnotes

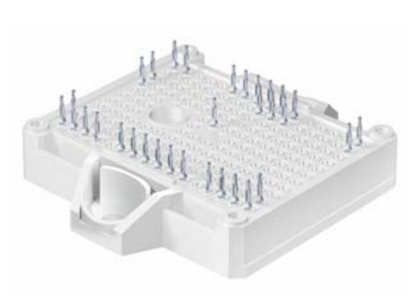
[1)] SEMIKRON Exclusive High Performance Thermal Paste (HPTP), available as pre-applied



MB-T

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
MOSFET 1				
V_{DSS}			1200	V
I_D	T_j = 175 °C	T_s = 25 °C	188	A
		T_s = 70 °C	157	A
I_{DM}	Pulse width t_p limited by T_{jmax}		480	A
$I_{DM,repetitive}$			260	A
V_{GS}	Max. transient gate - source voltage		-8 ... 19	V
T_j			-55 ... 175	°C
Integrated body diode				
I_{FM}	Pulse width t_p limited by T_{jmax}		480	A
$I_{FM,repetitive}$			260	A

Absolute Maximum Ratings			
Symbol	**Conditions**	**Values**	**Unit**
Module			
$I_{t(RMS)}$	$\Delta T_{terminal}$ at PCB joint = 30 K, per pin	30	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC, sinusoidal, t = 1 min	2500	V



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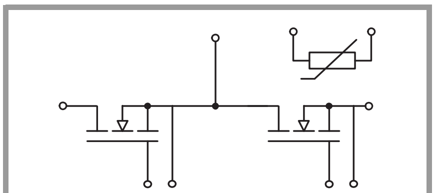

MB-T

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
MOSFET 1						
$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 0.1 mA, T_j = 25 °C		1200			V
$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 46 mA, T_j = 25 °C		1.8	2.5	3.6	V
I_{DSS}	V_{GS} = 0 V, V_{DS} = 1200 V, T_j = 25 °C				1	mA
I_{GSS}	V_{DS} = 0 V, V_{GS} = 15 V, T_j = 25 °C				400	nA
$R_{DS(on)}$	V_{GS} = 15 V, I_D = 166 A, chiplevel	T_j = 25 °C		8.0	11	mΩ
		T_j = 150 °C		13		mΩ
C_{iss}	V_{GS} = 0 V, V_{DS} = 1000 V, f = 0.1 MHz			13600		pF
C_{oss}	V_{GS} = 0 V, V_{DS} = 1000 V, f = 0.1 MHz			520		pF
C_{rss}	V_{GS} = 0 V, V_{DS} = 1000 V, f = 0.1 MHz			40		pF
R_{Gint}	T_j = 25 °C			3.4		Ω
Q_G	V_{DD} = 800 V, V_{GS} = -4 V ... 15 V, I_D = 166 A			472		nC
$t_{d(on)}$	V_{DD} = 600 V, V_{GS} = 15/-4 V, I_D = 160 A, $R_{G\,on/off}$ = 0.8 Ω, di/dt_{off} = 10 kA/µs, di/dt_{on} = 15 kA/µs, dv/dt = 27 kV/µs	T_j = 150 °C		49		ns
$t_{d(off)}$		T_j = 150 °C		120		ns
t_r		T_j = 150 °C		17		ns
t_f		T_j = 150 °C		29		ns
E_{on}		T_j = 150 °C		1.98		mJ
E_{off}		T_j = 150 °C		1.71		mJ
$R_{th(j-s)}$	per MOSFET, λ_{paste}=2.5 W/(mK) 1)			0.29		K/W
Integrated body diode						
$V_F = V_{SD}$	$-I_D$ = 83 A, V_{GS} = -4 V, chiplevel	T_j = 25 °C		4.6		V
		T_j = 150 °C		4.3		V
$V_{F0} = V_{SD0}$	chiplevel	T_j = 25 °C		3.8		V
		T_j = 150 °C		3.6		V
$r_F = r_{SD}$	chiplevel	T_j = 25 °C		9.7		mΩ
		T_j = 150 °C		8.5		mΩ
t_{rr}	V_{DD} = 600 V, $-I_D$ = 160 A, V_{GS} = -4 V, R_{Gon} = 0.8 Ω, di/dt_{off} = 16 kA/µs	T_j = 150 °C		40		ns
Q_{rr}		T_j = 150 °C		4.5		µC
I_{rr}		T_j = 150 °C		225		A
E_{rr}		T_j = 150 °C		1.48		mJ

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Module					
L_{CE}			6		nH
M_s	to heatsink	1.6		2.3	Nm
w	weight		35		g

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Temperature Sensor					
R_{100}	T_r = 100 °C		493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}\exp[B_{100/125}(1/T-1/T_{100})]$; T[K];		3550 ±2%		K

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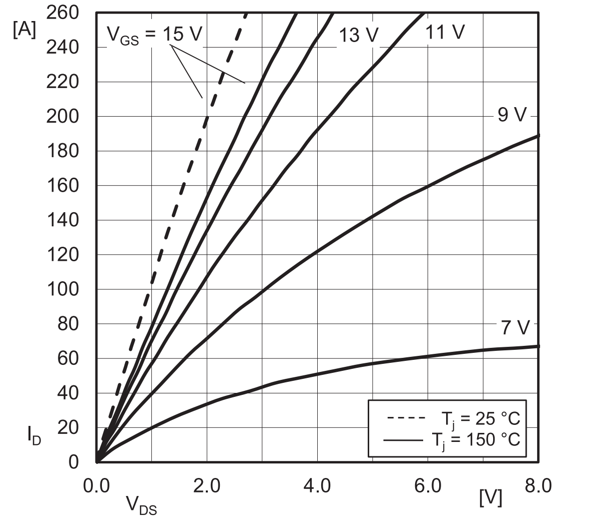

Fig.1: Typ. MOSFET forward output characteristic, incl. $R_{DD'+SS'}$

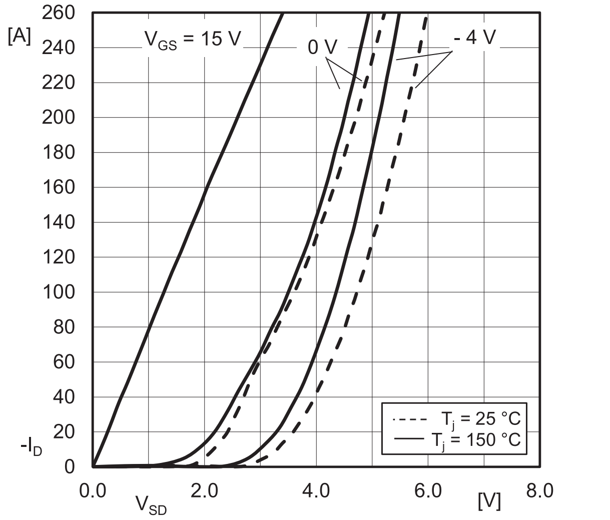

Fig. 2: Typ. MOSFET reverse output characteristics, incl. $R_{DD'+SS'}$

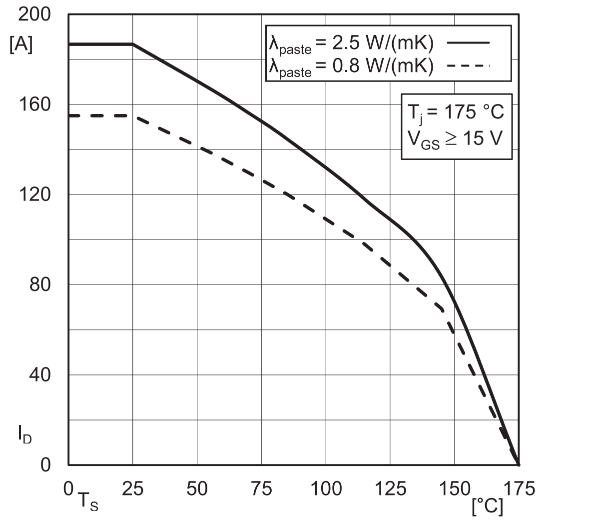

Fig. 3: Rated current vs. temperature $I_D = f(T_S)$

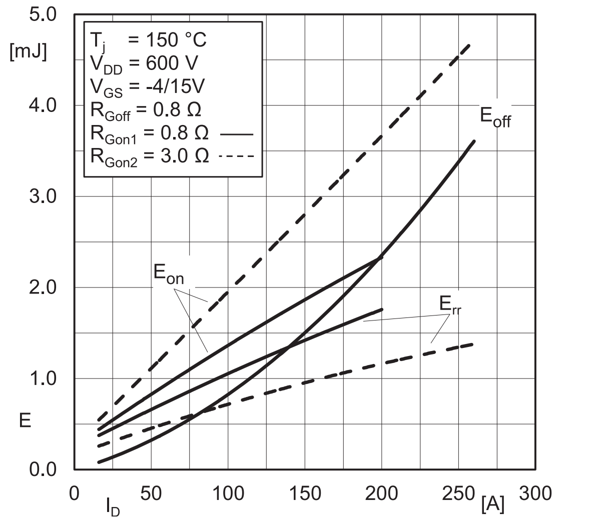

Fig. 4: Typ. turn-on/-off energy $E = f(I_D)$

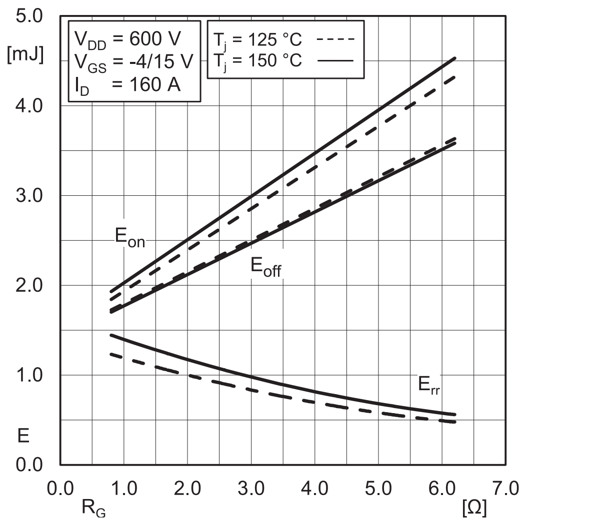

Fig. 5: Typ. turn-on /-off energy $E = f(R_G)$

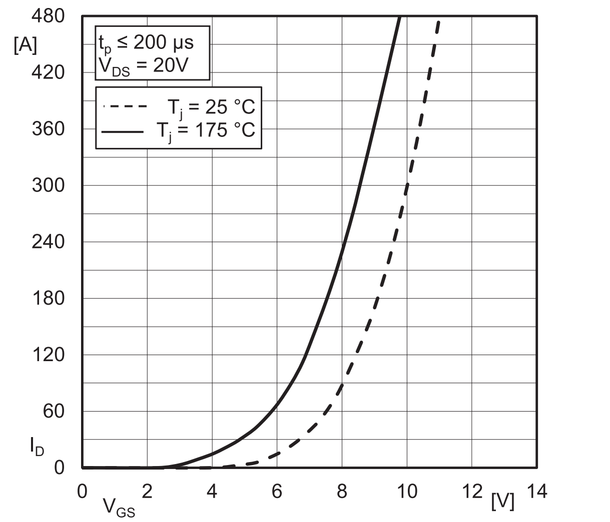

Fig. 6: Typ. MOSFET transfer characteristic

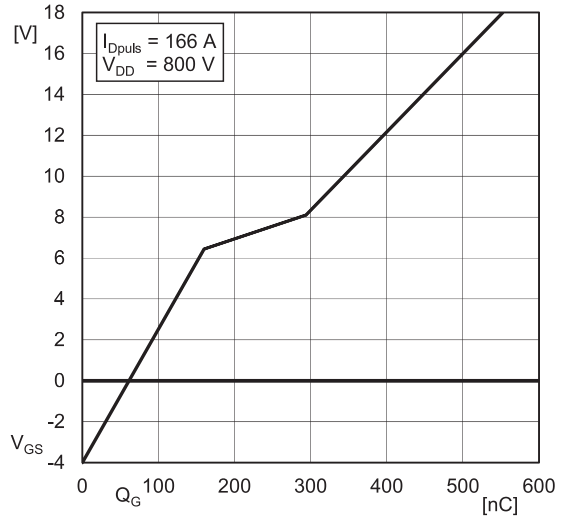

FIg. 7: Typ. MOSFET gate charge characteristic

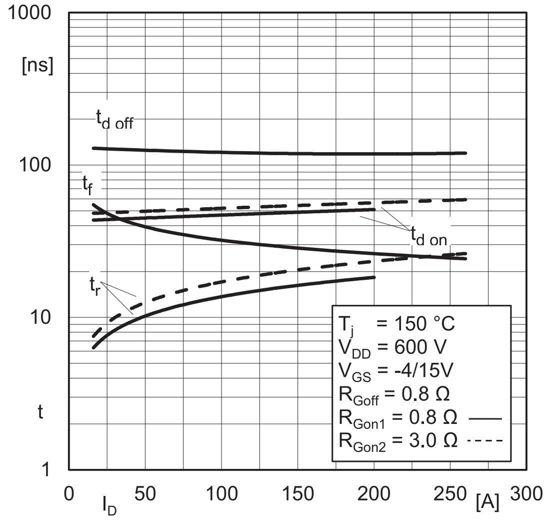

Fig. 8: Typ. switching times t = f (I_D)

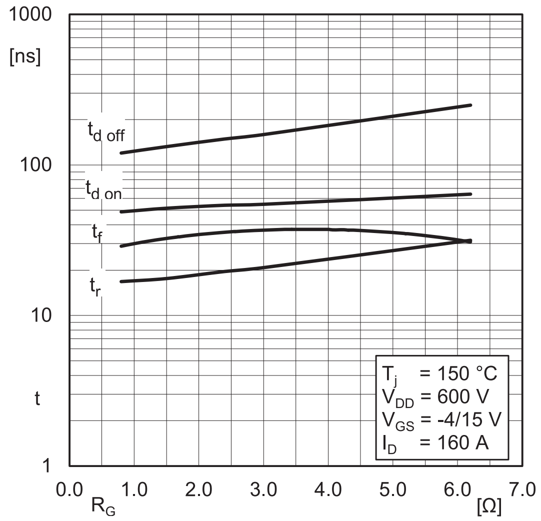

Fig. 9: Typical switching times t = f (R_G)

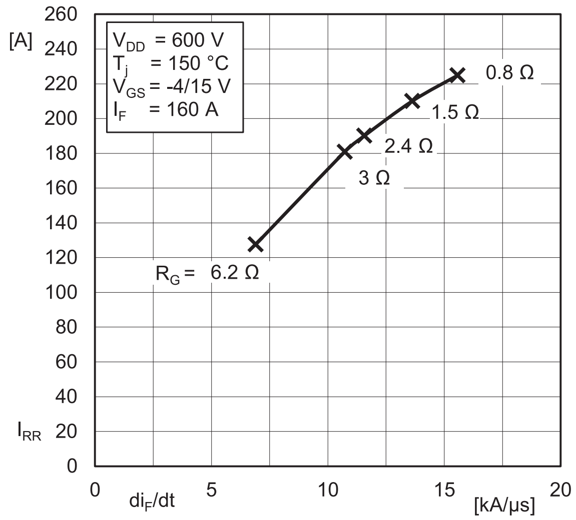

Fig. 10: Typ. diode peak reverse recovery current I_{RR} = f (di_F/dt)

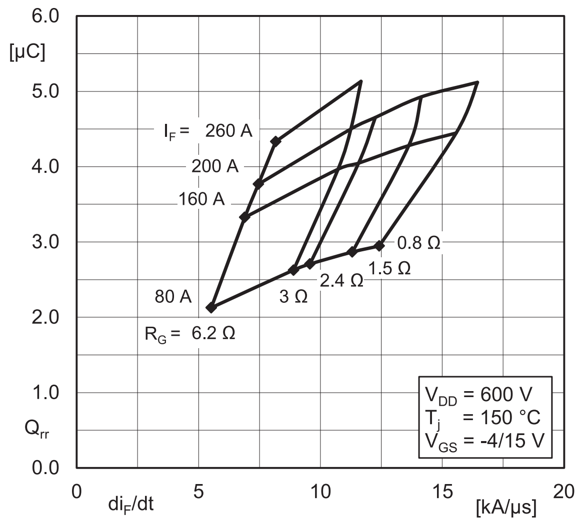

Fig. 11: Typ. diode peak reverse recovery charge Q_{RR} = f (di_F/dt)

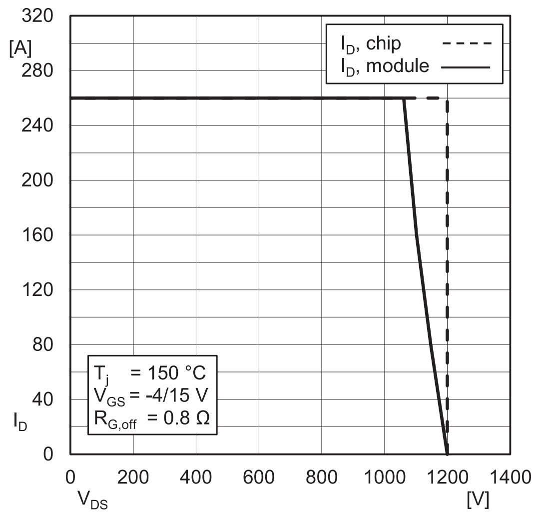

Fig. 12: MOSFET Reverse Bias Safe Operating Area (RBSOA)

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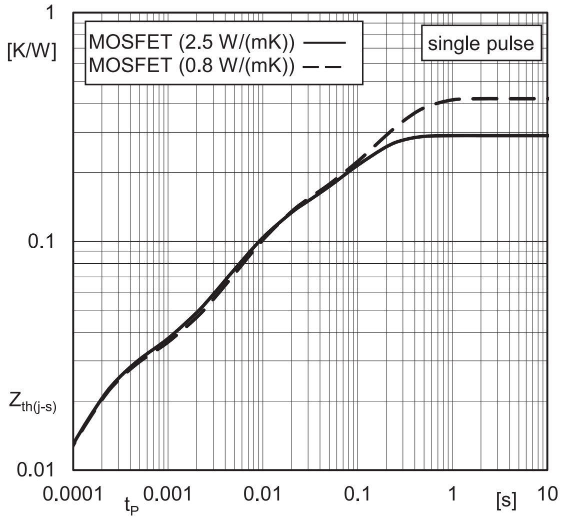
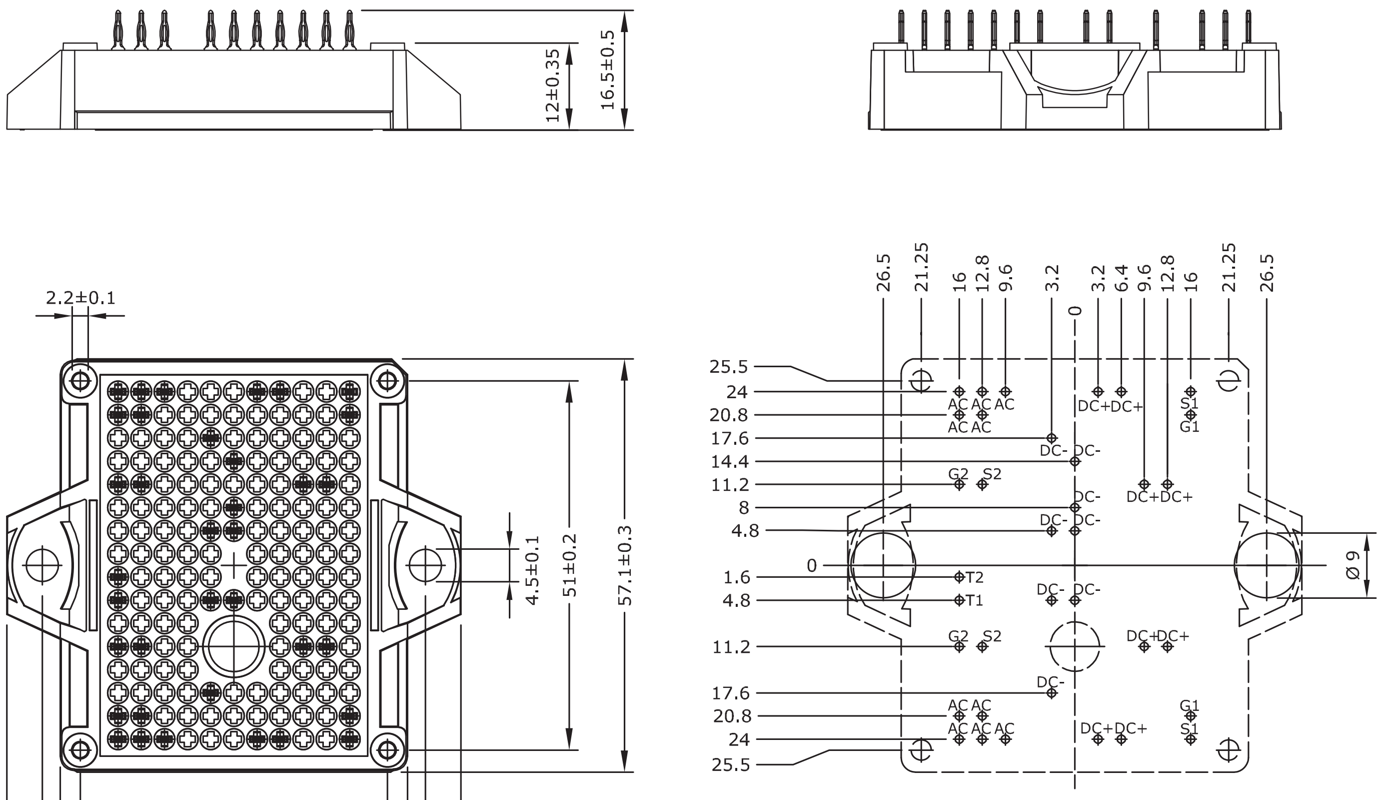
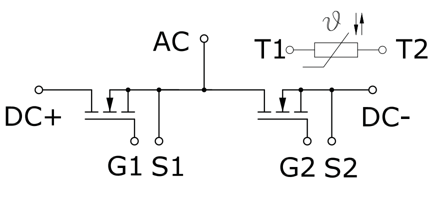


Fig. 13: Typ. transient thermal impedance



- Pin-Grid 3.2 mm
- Tolerance of PCB hole pattern ⌖ Ø0.1
- Diameters of drill Ø 1.15mm
- Copper thickness in hole 25 - 50 µm
- Hole specification for contacts:
  refer to SEMITOP E1/E2 Mounting Instruction

SEMITOP®E2



MB-T

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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