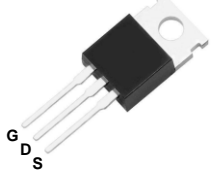

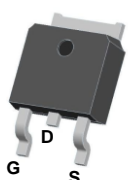
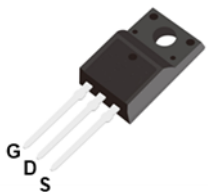
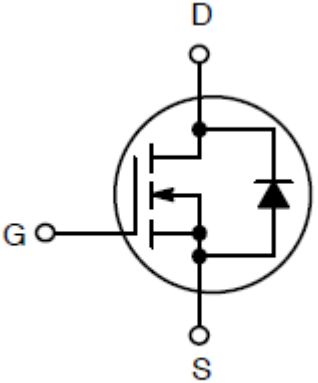


N-channel 650V, 0.86Ω typ.,
 Super Junction MOSFET G2 in TO-220, TO-251, TO-252 and TO-220F

Datasheet - production data

1. Descriptions

TO-220	TO-251
	
TO-252	TO-220F
	
N-Channel MOSFET	
 <p style="text-align: center;">POWER MOSFET</p>	

Key Performance Parameters

Parameters	Value	Unit
BV_{DSS}	650	V
$R_{DS(on),max}$	0.95	Ω
$Q_{g,typ}$	7.7	nC
$I_{D,pulse}$	8	A
E_{AS}	100	mJ

Features

- Extremely Low Losses Due to Very Low FOM $R_{ds(on)} \cdot Q_g$ and E_{oss} .
- Very High Commutation Ruggedness.
- Qualified for Industrial Grade Applications According to JEDEC.

Applications

PFC Stages, Hard Switching PWM Stages and Resonant Switching PWM Stages for Adapter, LCD TV, Lighting, and UPS.

Type/Ordering Code	Package	Marking	Related Links
CPP65R950G2	TO-220	65R950G2	See Appendix A
CPI65R950G2	TO-251		
CPD65R950G2	TO-252		
CPA65R950G2	TO-220F		

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7.	Package Outlines	11
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2. Maximum Ratings

At $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 1. Absolute Maximum Ratings

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{DS}	Drain-source voltage ¹⁾	-	-	650	V	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$
I_D	Continuous drain current ²⁾	-	-	4.5 3.0	A	$T_C=25^\circ\text{C}$ $T_C=125^\circ\text{C}$
$I_{D,pulse}$	Pulsed drain current	-	-	8	A	$T_C=25^\circ\text{C}$
E_{AS}	Avalanche energy, single pulse ³⁾	-	-	100	mJ	$I_D=2\text{A}$; $V_{DD}=50\text{V}$
I_{AR}	Avalanche current, repetitive	-	-	2	A	-
dv/dt	MOSFET dv/dt ruggedness	-	-	50	V/ns	$V_{DS}=0\dots520\text{V}$
V_{GS}	Gate source voltage	-30	-	30	V	static; AC ($f>1\text{ Hz}$)
P_{tot}	Power dissipation (Non FullPAK) TO-220, TO-251, TO-252	-	-	37	W	$T_C=25^\circ\text{C}$
P_{tot}	Power dissipation (FullPAK) TO-220F	-	-	28	W	$T_C=25^\circ\text{C}$
T_j, T_{stg}	Operating and storage temperature	-55	-	150	$^\circ\text{C}$	-
I_S	Continuous diode forward current	-	-	4.5	A	$T_C=25^\circ\text{C}$
$I_{S,pulse}$	Diode pulse current ²⁾	-	-	8	A	$T_C=25^\circ\text{C}$
dv/dt	Reverse diode dv/dt ⁴⁾	-	-	15	V/ns	$V_{DS}=0\dots400\text{V}$, $I_{SD}\leq I_S$, $T_j=25^\circ\text{C}$
di/dt	Maximum diode commutation speed ⁴⁾	-	-	500	A/ μs	$V_{DS}=0\dots400\text{V}$, $I_{SD}\leq I_S$, $T_j=25^\circ\text{C}$

1) Limited by $T_{j,max}$. Maximum duty cycle $D=0.75$.

2) Pulse width t_p limited by $T_{j,max}$.

3) $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_j=25^\circ\text{C}$.

4) $V_{DClink}=400\text{V}$; $V_{DS,peak}<V_{(BR)DSS}$; identical low side and high side switch with identical R_G .

3. Thermal Characteristics

Table 2. Thermal Characteristics (Non FullPAK) TO-220, TO-251, TO-252

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
R_{thJC}	Thermal resistance, junction - case	-	-	3.4	°C/W	$T_C = 25^\circ\text{C}$
R_{thJA}	Thermal resistance, junction - ambient	-	-	62	°C/W	$T_C = 25^\circ\text{C}$
T_{sold}	Soldering temperature, wavesoldering only allowed at leads	-	-	260	°C	Lead Temperature (Soldering, 10 sec)

Table 3. Thermal Characteristics (FullPAK) TO-220F

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
R_{thJC}	Thermal resistance, junction - case	-	-	4.5	°C/W	$T_C = 25^\circ\text{C}$
R_{thJA}	Thermal resistance, junction - ambient	-	-	62.5	°C/W	$T_C = 25^\circ\text{C}$
T_{sold}	Soldering temperature, wavesoldering only allowed at leads	-	-	260	°C	Lead Temperature (Soldering, 10 sec)

4. Electrical Characteristics

at $T_j = 25^\circ\text{C}$, unless otherwise specified

Table 4. Static Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-source breakdown voltage	650	-	-	V	$V_{GS}=0V, I_D=250\mu A$
$V_{(GS)th}$	Gate threshold voltage	2.0	3.3	4.0	V	$V_{DS}=V_{GS}, I_D=250\mu A$
I_{DSS}	Zero gate voltage drain current	-	-	1 10	μA	$V_{DS}=650V, V_{GS}=0V, T_j=25^\circ C$ $V_{DS}=650V, V_{GS}=0V, T_j=150^\circ C$
I_{GSS}	Gate-source leakage current	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
$R_{DS(on)}$	Drain-source on-state resistance	-	0.86 2.1	0.95 2.35	Ω	$V_{GS}=10V, I_D=1.5A, T_j=25^\circ C$ $V_{GS}=10V, I_D=1.5A, T_j=150^\circ C$
R_G	Gate resistance	-	3.8	-	Ω	$V_{DD}=0V, V_{GS}=0V, F=1MHz$

Table 5. Dynamic Characteristics

Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
C_{iss}	Input capacitance	-	263	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
C_{oss}	Output capacitance	-	19.9	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
C_{riss}	Reverse transfer capacitance	-	1.82	-	pF	$V_{GS}=0V, V_{DS}=50V, f=1MHz$
$t_{d(on)}$	Turn-on delay time	-	12.8	-	ns	$V_{DD}=400V, V_{GS}=10V, I_D=2.2A,$
t_r	Rise time	-	26.4	-	ns	$V_{DD}=400V, V_{GS}=10V, I_D=2.2A,$
$t_{d(off)}$	Turn-off delay time	-	22.2	-	ns	$V_{DD}=400V, V_{GS}=10V, I_D=2.2A,$
t_f	Fall time	-	75.6	-	ns	$V_{DD}=400V, V_{GS}=10V, I_D=2.2A,$

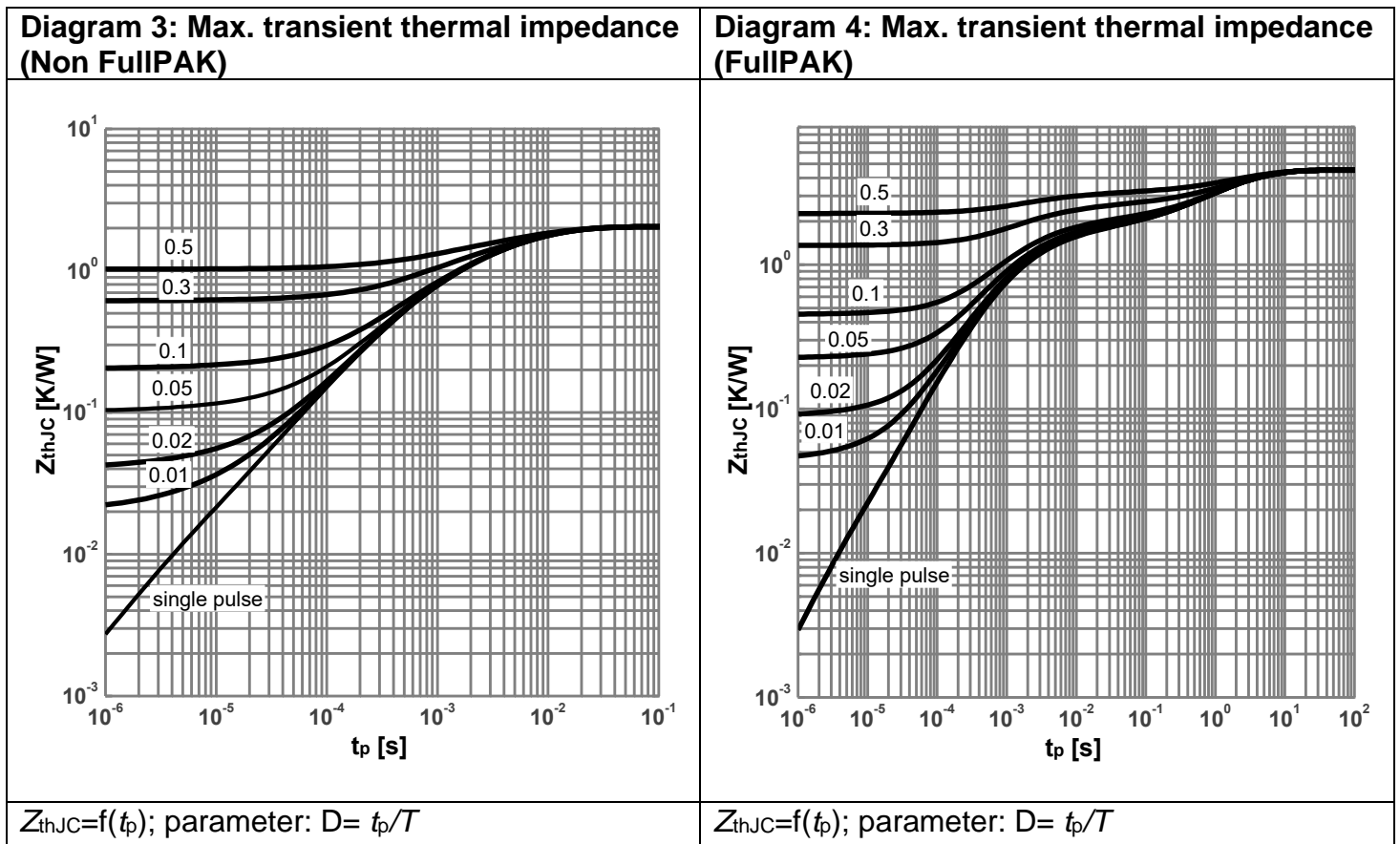
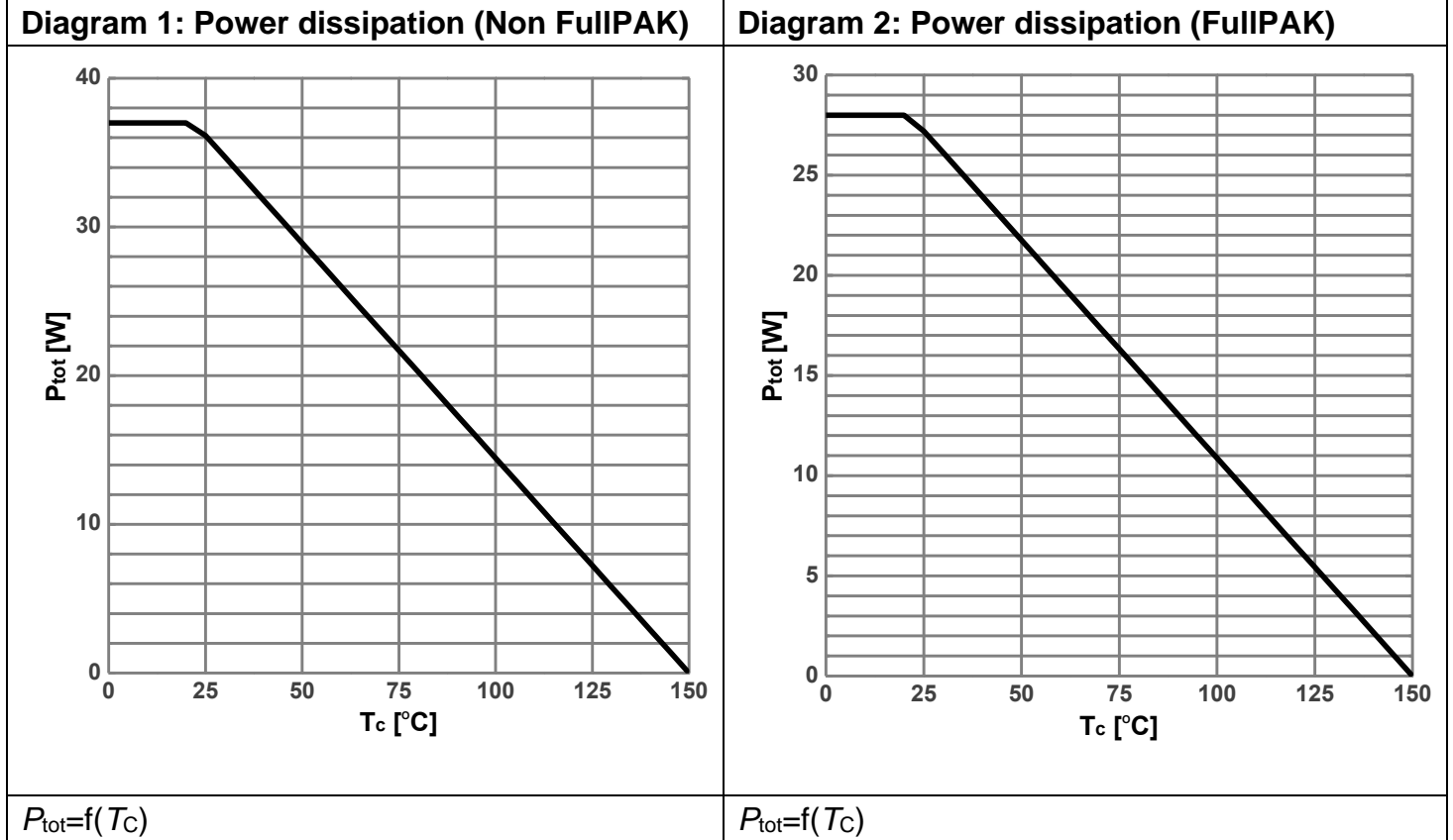
Table 6. Gate Charge Characteristics

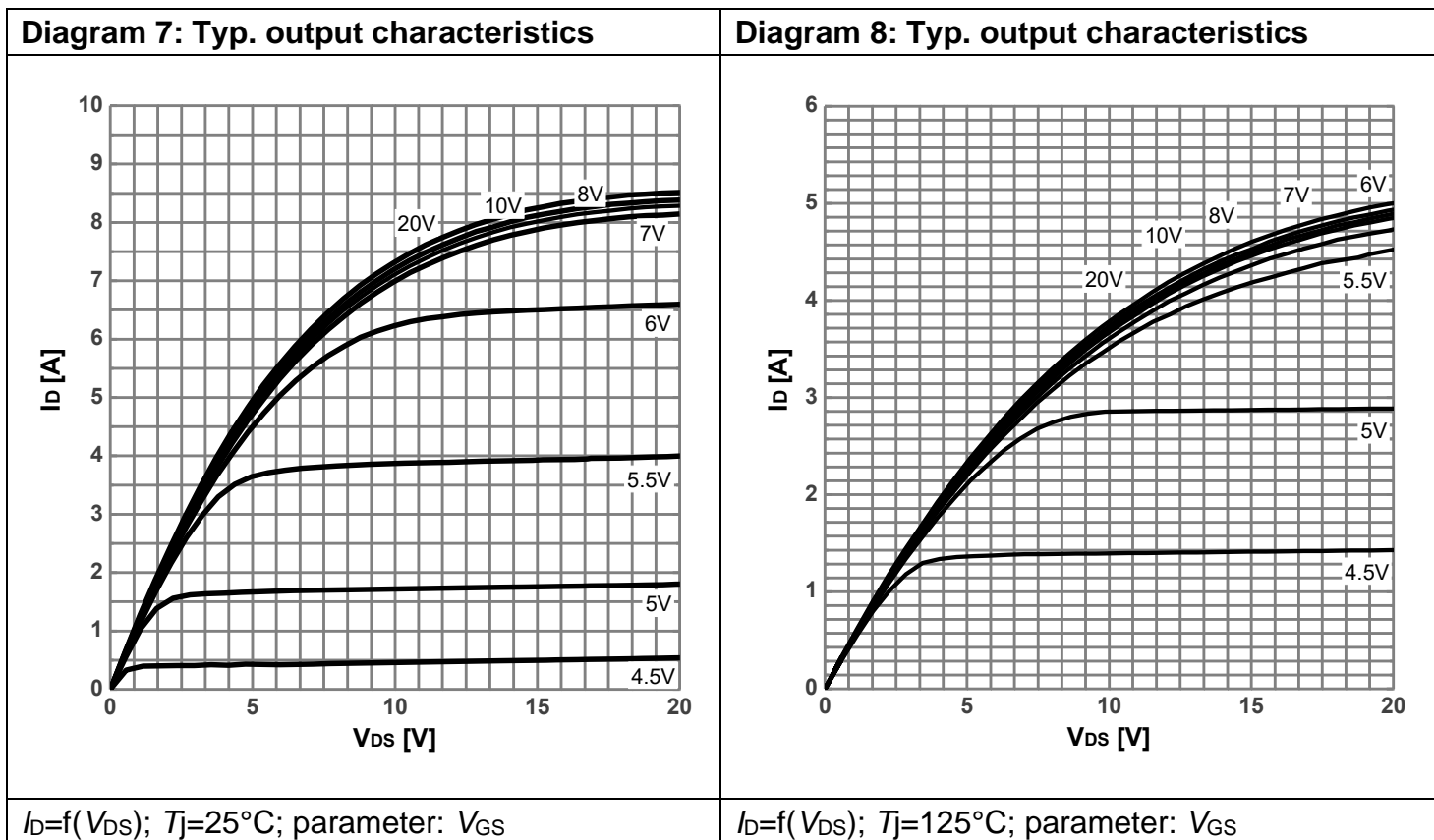
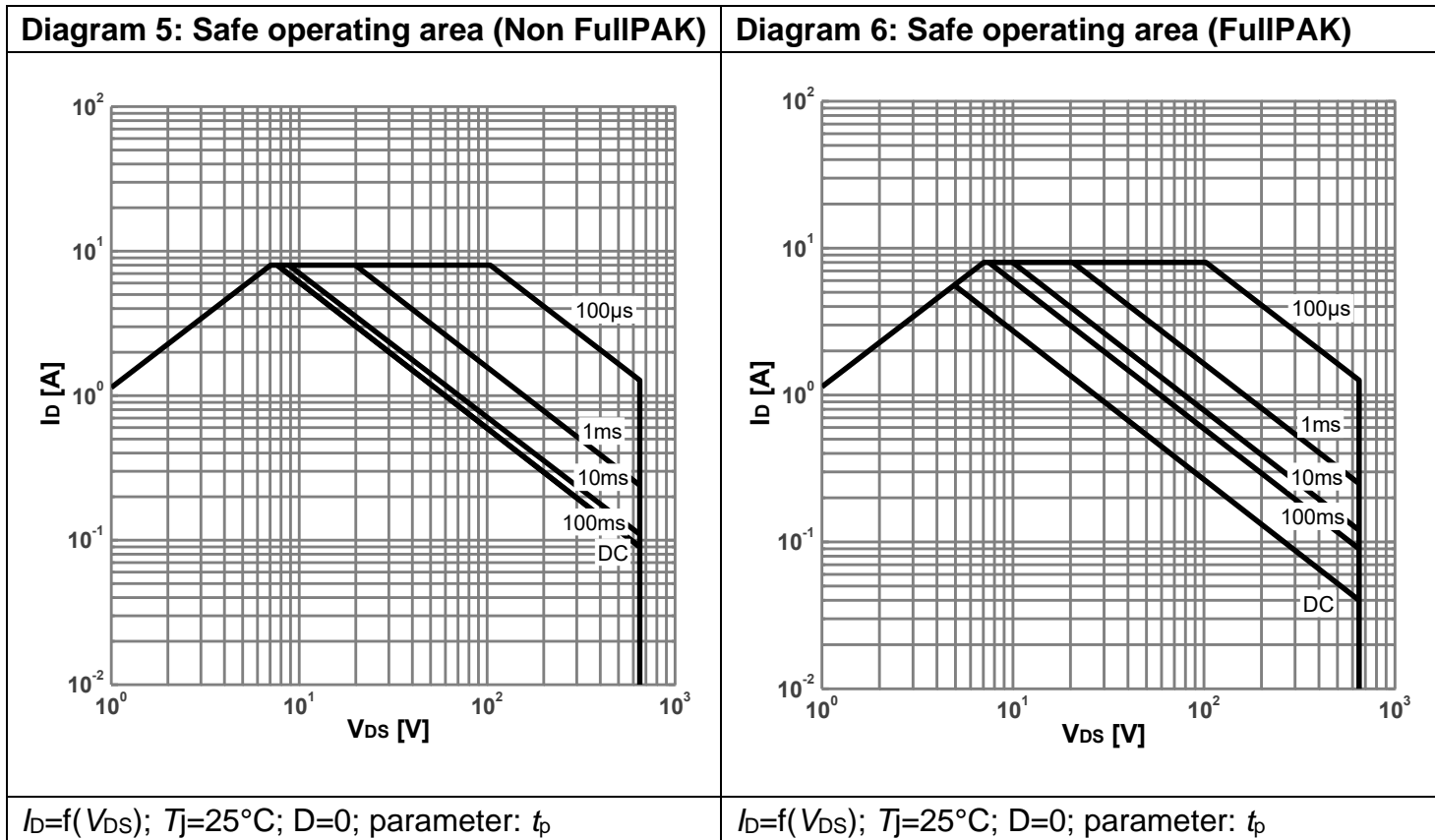
Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
Q_{gs}	Gate to source charge	-	1.07	-	nC	$V_{DD}=480V, I_D=2A, V_{GS}=0 \text{ to } 10V$
Q_{gd}	Gate to drain charge	-	3.63	-	nC	$V_{DD}=480V, I_D=2A, V_{GS}=0 \text{ to } 10V$
Q_g	Gate charge total	-	7.72	-	nC	$V_{DD}=480V, I_D=2A, V_{GS}=0 \text{ to } 10V$
$V_{plateau}$	Gate plateau voltage	-	3.91	-	V	$V_{DD}=480V, I_D=2A, V_{GS}=0 \text{ to } 10V$

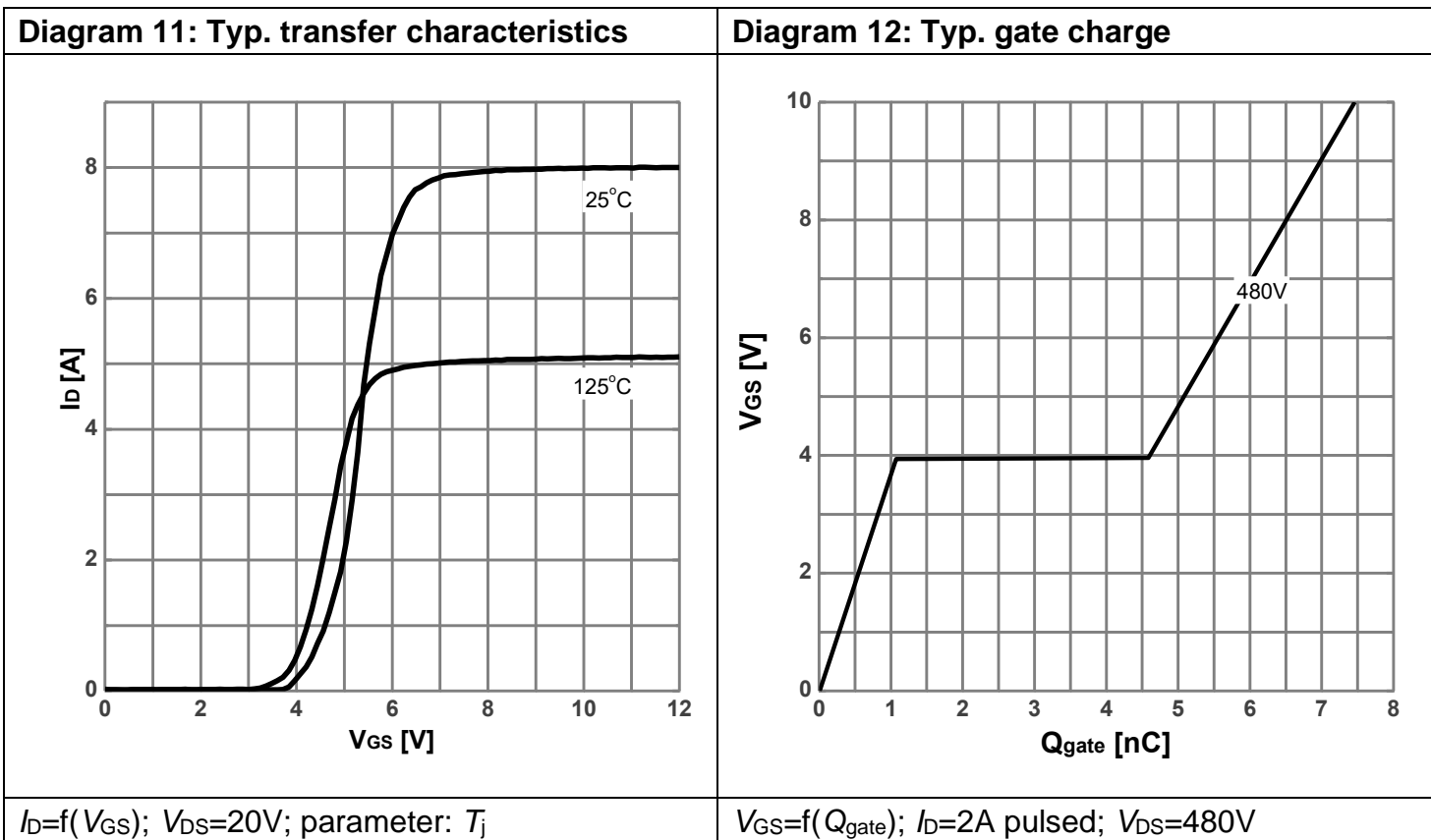
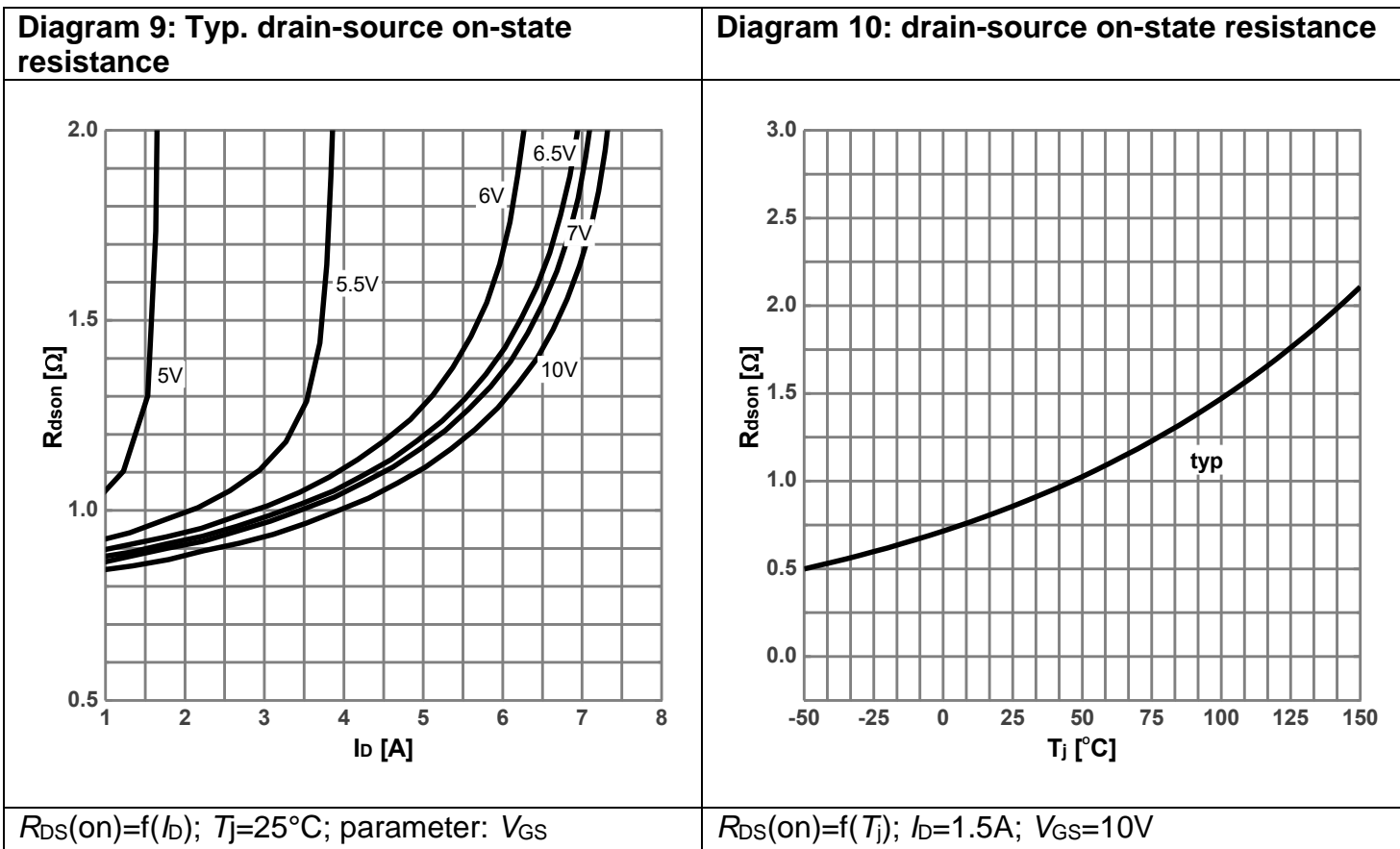
Table 7. Reverse Diode Characteristics

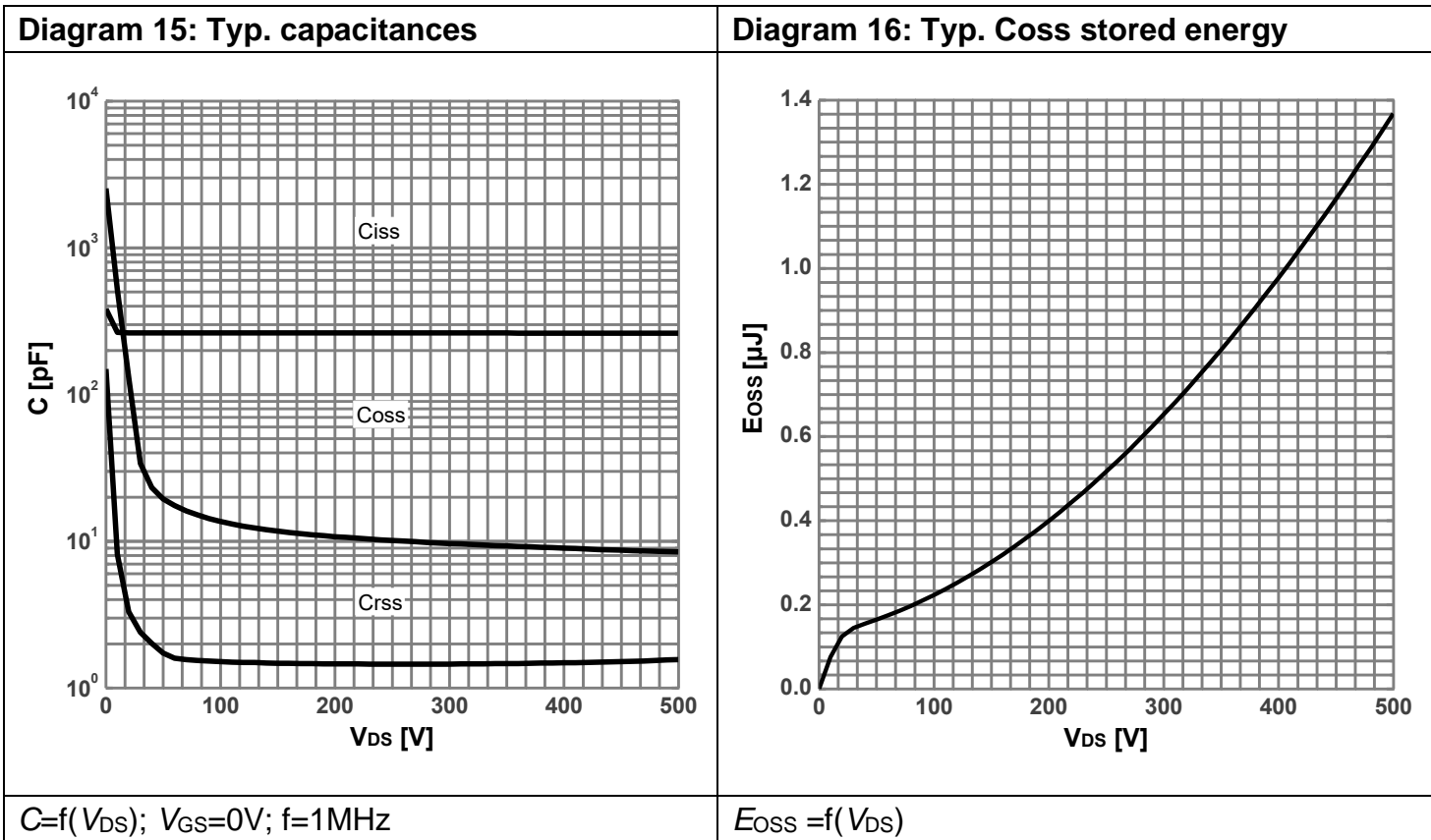
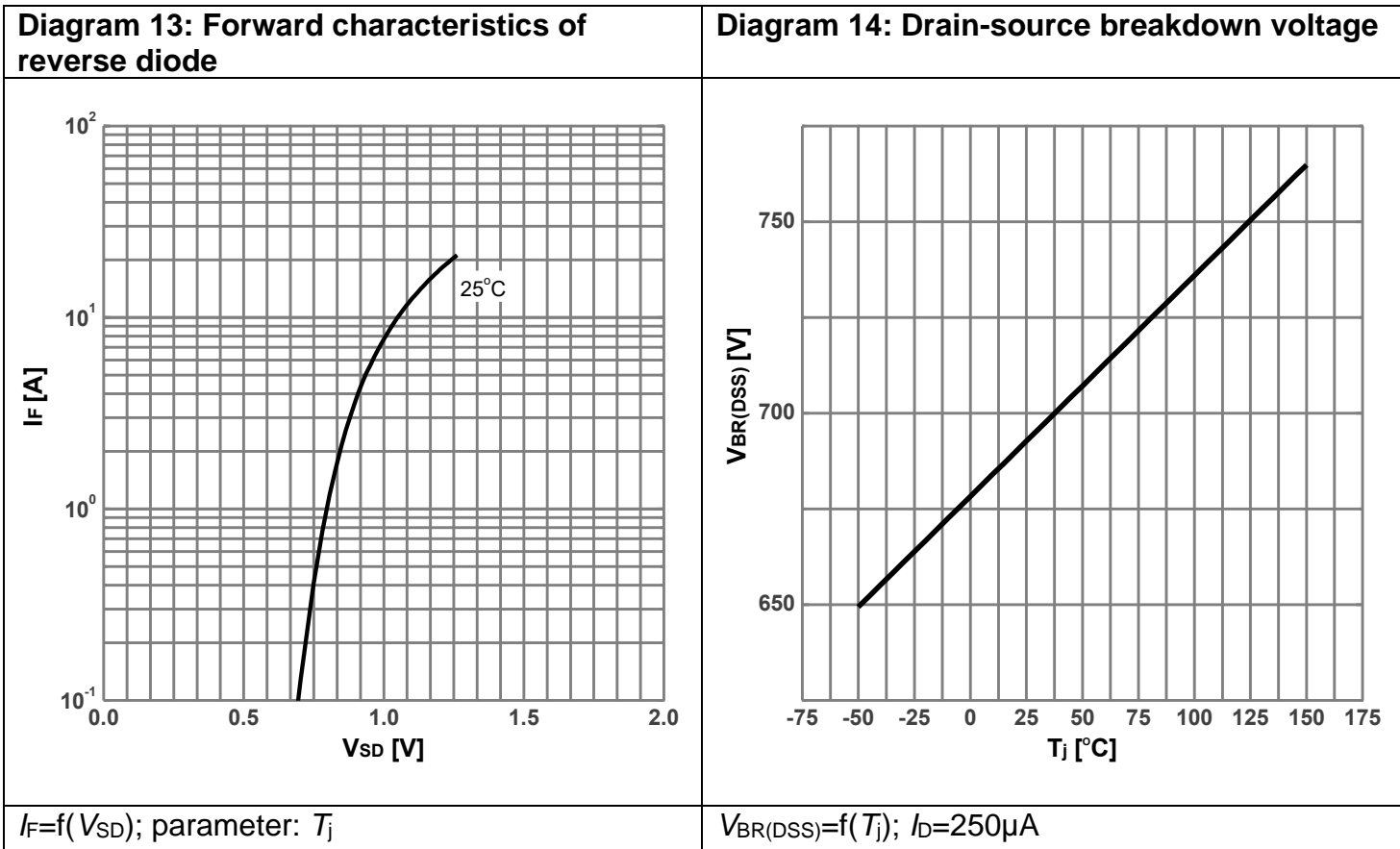
Symbol	Parameter	Values			Unit	Test Condition
		Min.	Typ.	Max.		
V_{SD}	Diode forward voltage	-	0.818	-	V	$V_{GS}=0V, I_F=2A, T_j=25^\circ C$
t_{rr}	Reverse recovery time	-	170	-	ns	$V_R=400V, I_F=2.2A, di_F/di=100A/\mu s$
Q_{rr}	Reverse recovery charge	-	0.92	-	μC	$V_R=400V, I_F=2.2A, di_F/di=100A/\mu s$
I_{rrm}	Peak reverse recovery current	-	10.4	-	A	$V_R=400V, I_F=2.2A, di_F/di=100A/\mu s$

5. Electrical Characteristics Diagrams









6. Test Circuits

Table 8. Diode Characteristics

<p>Test circuit for diode characteristics</p>	<p>Diode recovery waveform</p> <p> $t_{rr} = t_F + t_S$ $Q_{rr} = Q_F + Q_S$ </p>
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Table 9. Switching Times

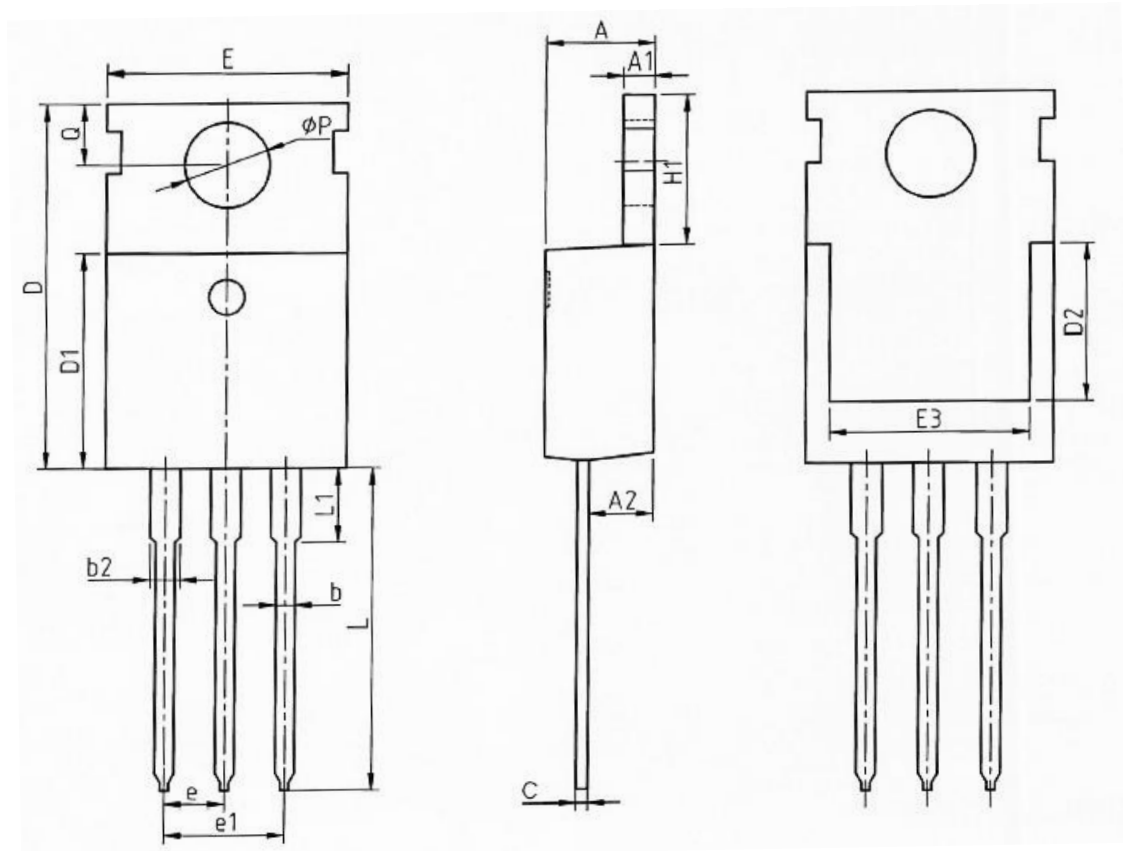
<p>Switching times test circuit for inductive load</p>	<p>Switching times waveform</p>
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Table 10. Unclamped Inductive Load

<p>Unclamped inductive load test circuit</p>	<p>Unclamped inductive waveform</p>
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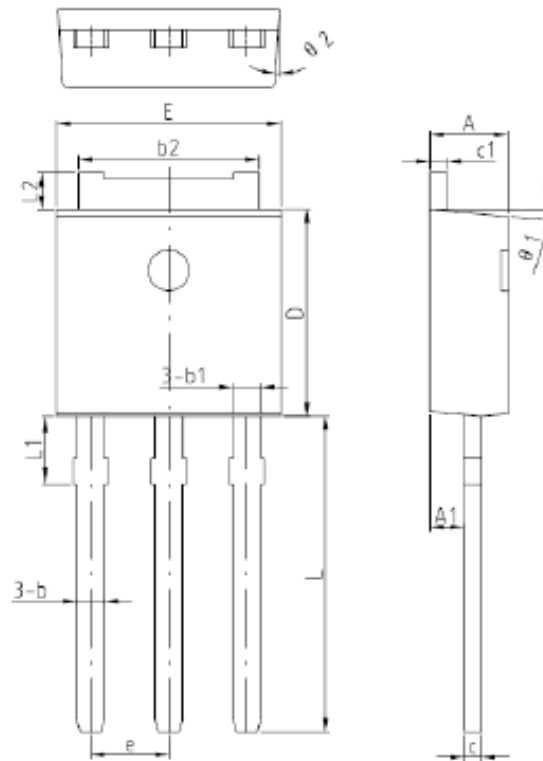
7. Package Outlines

Figure 1 Outline TO-220 Dimensions in mm



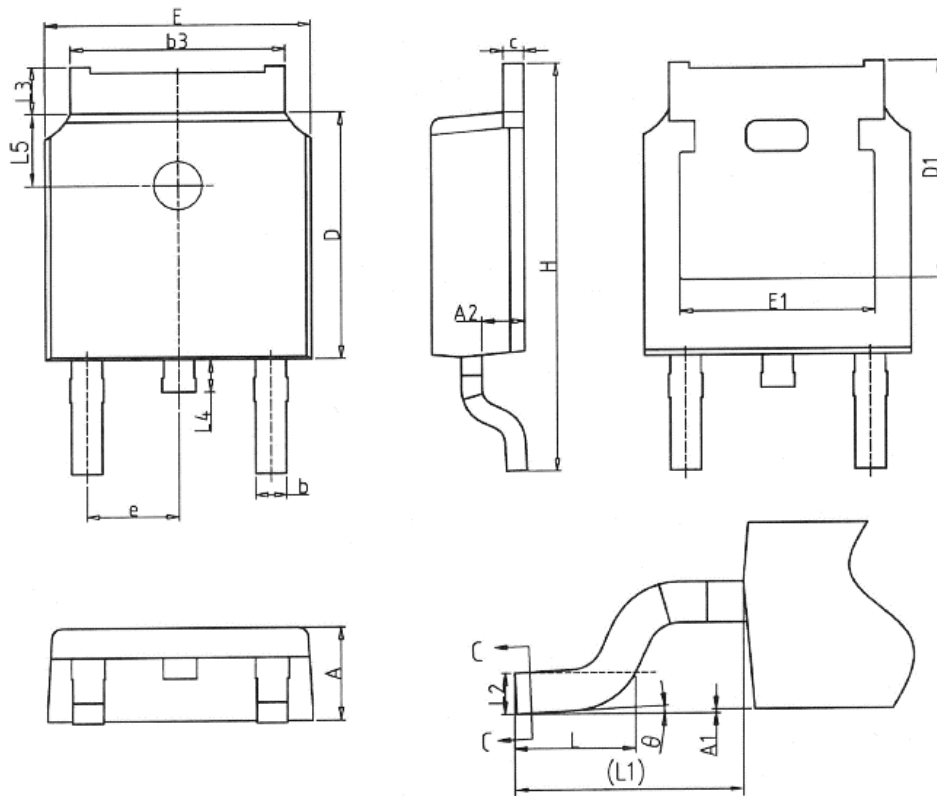
Dimensions In Millimeters		
Symbol	Min	Max
A	4.37	4.70
A1	1.25	1.40
A2	2.20	2.60
b	0.70	0.95
b2	1.17	1.47
c	0.45	0.60
D	15.10	16.10
D1	8.80	9.40
D2	5.50	-
E	9.70	10.30
E3	7.00	-
e	2.54BSC	
e1	5.08BSC	
H1	6.25	6.85
L	12.75	13.80
L1	-	3.40
ØP	3.40	3.80
Q	2.60	3.00

Figure 2 Outline TO-251 Dimensions in mm



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	2.20	2.30	2.40
A1	0.90	1.01	1.17
b	0.50	-	0.91
b1	-	0.81	-
b2	5.13	5.33	5.46
c	0.46	0.50	0.60
c1	0.46	0.50	0.60
D	5.95	6.10	6.25
E	6.45	6.60	6.75
e	2.286(BSC)		
L	9.00	9.30	9.60
L1	-	2.00	-
L2	0.90	-	1.25
θ_1	-	5°	-
θ_2	-	3°	-

Figure 3 Outline TO-252 Dimensions in mm

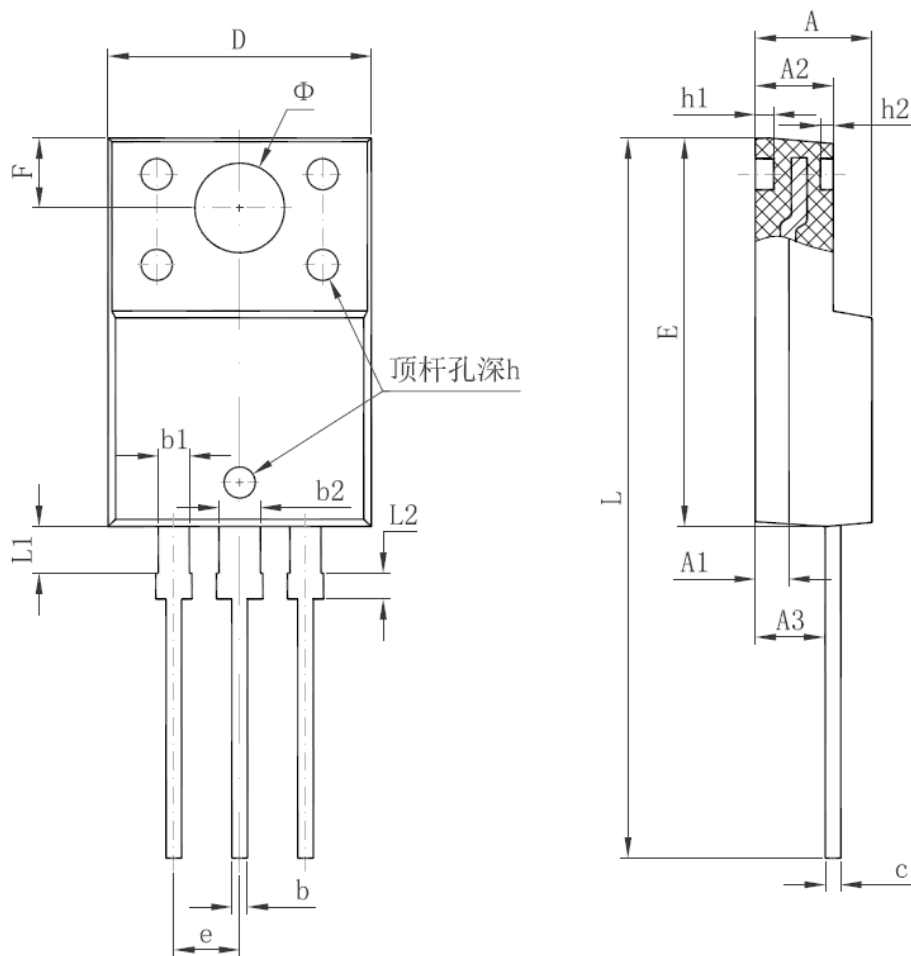


NOTES

1. ALL DIMENSIONS REFER TO JEDEC STANDARD TO-252 AA,
DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

Dimensions In Millimeters		
Symbol	Min	Max
A	2.20	2.38
A1	0.00	0.20
A2	0.97	1.17
b	0.68	0.90
b3	5.20	5.46
c	0.43	0.61
D	5.98	6.22
D1	5.30REF	
E	6.40	6.73
E1	4.63	-
c	2.286BSC	
H	9.40	10.50
L	1.38	1.75
L1	2.60REF	
L2	0.51BSC	
L3	0.88	1.28
L4	0.50	1.00
L5	1.65	1.95
θ	0°	8°

Figure 4 Outline TO-220 FullPAK Dimensions in mm



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	1.300 REF.		0.051 REF.	
A2	2.800	3.200	0.110	0.126
A3	2.500	2.900	0.098	0.114
b	0.500	0.750	0.020	0.030
b1	1.100	1.350	0.043	0.053
b2	1.500	1.750	0.059	0.069
c	0.500	0.750	0.020	0.030
D	9.960	10.360	0.392	0.408
E	14.800	15.200	0.583	0.598
e	2.540 TYP.		0.100 TYP.	
F	2.700 REF.		0.106 REF.	
Φ	3.500 REF.		0.138 REF.	
h	0.000	0.300	0.000	0.012
h1	0.800 REF.		0.031 REF.	
h2	0.500 REF.		0.020 REF.	
L	28.000	28.400	1.102	1.118
L1	1.700	1.900	0.067	0.075
L2	0.900	1.100	0.035	0.043

8. Appendix

CoolSemi Webpage: www.coolsemi.com.

单击下面可查看定价，库存，交付和生命周期等信息

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