



STD65N55LF3

N-channel 55 V, 7.0 mΩ, 80 A DPAK
STripFET™ III Power MOSFET

Features

Order code	V _{DSS}	R _{DS(on)} max.	I _D	P _w
STD65N55LF3	55 V	< 8.5 mΩ	80 A	110 W

- Low threshold drive
- 100% avalanche tested

Application

- Switching applications
- Automotive

Description

This product is a N-channel enhancement mode Power MOSFET built with STripFET™ III technology which is especially tailored to minimized on-state resistance and gate charge, providing superior switching performance.

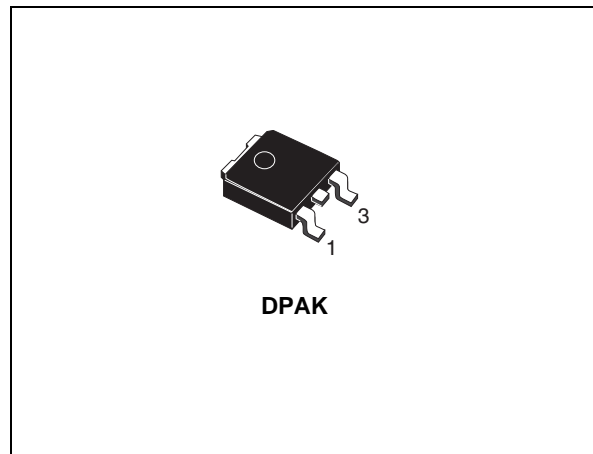


Figure 1. Internal schematic diagram

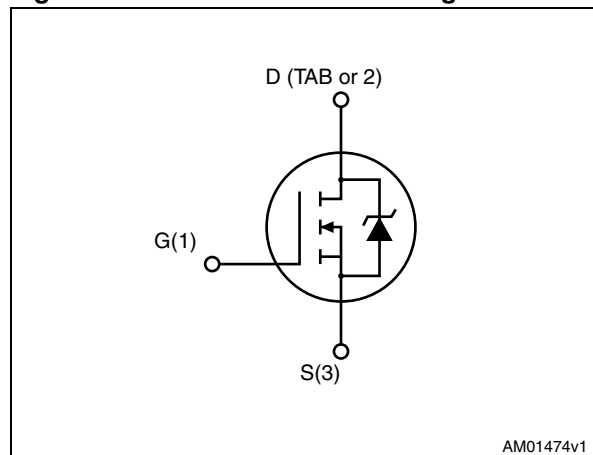


Table 1. Device summary

Order code	Marking	Package	Packaging
STD65N55LF3	65N55LF3	DPAK	Tape and reel

Contents

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1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage ($V_{GS}=0$)	55	V
V_{GS}	Gate-Source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	80	A
I_D	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	56	A
$I_{DM}^{(1)}$	Drain current (pulsed)	320	A
P_{TOT}	Total dissipation at $T_C = 25\text{ }^\circ\text{C}$	110	W
	Derating factor	0.73	W/ $^\circ\text{C}$
$dv/dt^{(2)}$	Peak diode recovery voltage slope	11	V/ns
$E_{AS}^{(3)}$	Single pulse avalanche energy	300	mJ
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 175	$^\circ\text{C}$

1. Pulse width limited by safe operating area
2. $I_{SD} \leq 65\text{ A}$, $di/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{jmax}$
3. Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = 10\text{ A}$, $V_{DD} = 25\text{ V}$

Table 3. Thermal resistance

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case max	1.36	$^\circ\text{C}/\text{W}$
$R_{thj-pcb}^{(1)}$	Thermal resistance junction-pcb max	50	$^\circ\text{C}/\text{W}$

1. When mounted on FR-4 board of 1inch², 2oz Cu.

2 Electrical characteristics

($T_{CASE} = 25\text{ °C}$ unless otherwise specified)

Table 4. Static

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{GS} = 0$	55			V
I_{DSS}	Zero gate voltage drain current ($V_{GS} = 0$)	$V_{DS} = \text{Max rating}$, $V_{DS} = \text{Max rating}$, $T_c = 125\text{ °C}$			10 100	μA μA
I_{GSS}	Gate body leakage current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 200	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\ \mu\text{A}$	1		2.5	V
$R_{DS(on)}$	Static drain-source on resistance	$V_{GS} = 10\text{ V}$, $I_D = 32\text{ A}$		7.0	8.5	$\text{m}\Omega$
		$V_{GS} = 5\text{ V}$, $I_D = 32\text{ A}$		8.5	12	$\text{m}\Omega$

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0$		2200		pF
C_{oss}	Output capacitance		-	470	-	pF
C_{rss}	Reverse transfer capacitance				35	
Q_g	Total gate charge	$V_{DD} = 27.5\text{ V}$, $I_D = 65\text{ A}$ $V_{GS} = 5\text{ V}$ (see Figure 16)		20		nC
Q_{gs}	Gate-source charge		-	8	-	nC
Q_{gd}	Gate-drain charge				8	

Table 6. Switching on/off (inductive load)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD}=27\text{ V}$, $I_D=32\text{ A}$, $R_G=4.7\ \Omega$, $V_{GS}=10\text{ V}$ (see Figure 15)	-	10	-	ns
t_r	Rise time		-	25	-	ns
$t_{d(off)}$	Turn-off delay time		-	50	-	ns
t_f	Fall time		-	10	-	ns

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		80	A
I_{SDM}	Source-drain current (pulsed) ⁽¹⁾		-		320	A
V_{SD}	Forward on voltage	$I_{SD}=65\text{ A}$, $V_{GS}=0$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD}=65\text{ A}$, $di/dt=100\text{ A}/\mu\text{s}$, $V_{DD}=30\text{ V}$, $T_j=150\text{ }^\circ\text{C}$ (see Figure 17)	-	40		ns
Q_{rr}	Reverse recovery charge		-	60		nC
I_{RRM}	Reverse recovery current		-	3		A

1. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

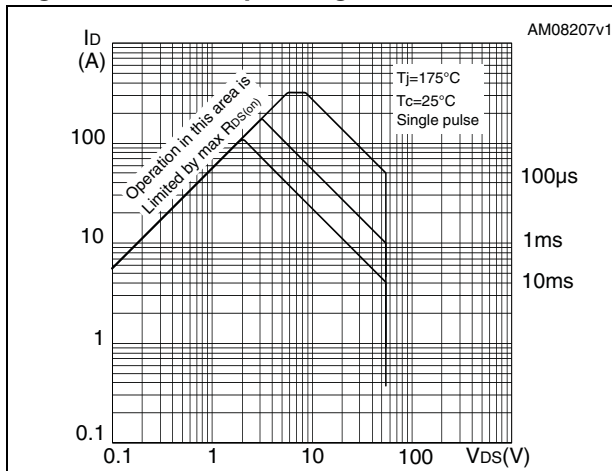


Figure 3. Thermal impedance

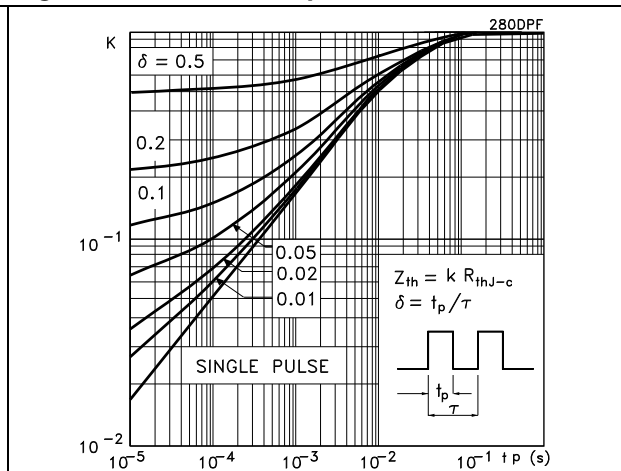


Figure 4. Output characteristics

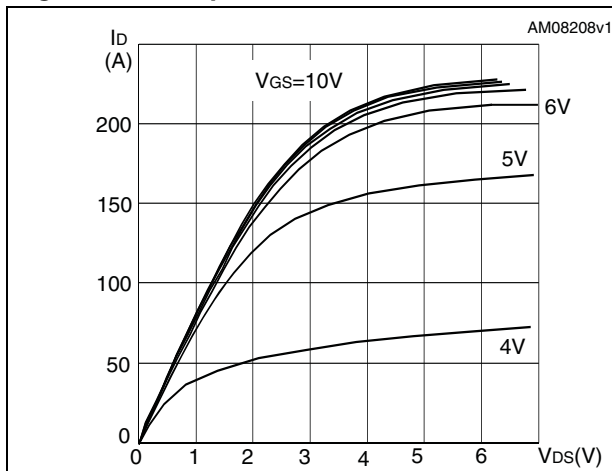


Figure 5. Transfer characteristics

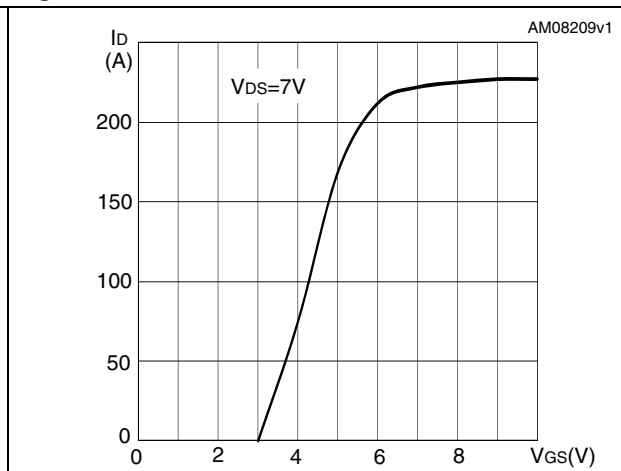


Figure 6. Normalized BV_{DSS} vs temperature

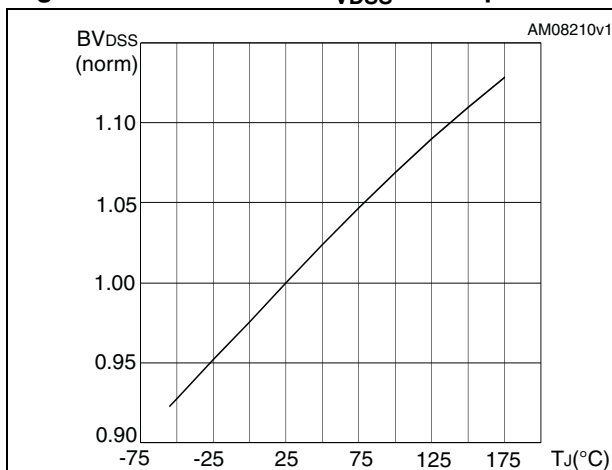


Figure 7. Static drain-source on resistance

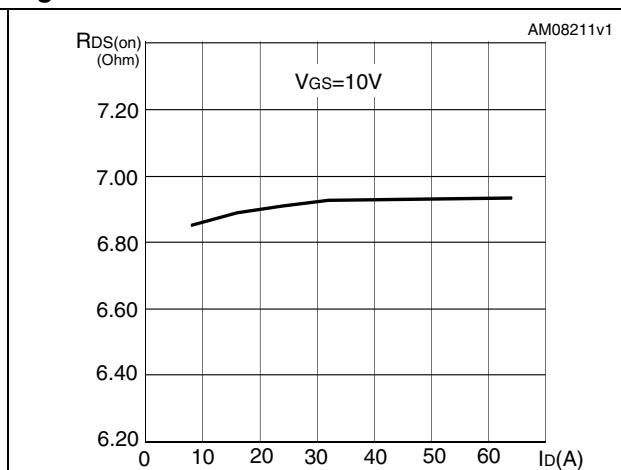


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

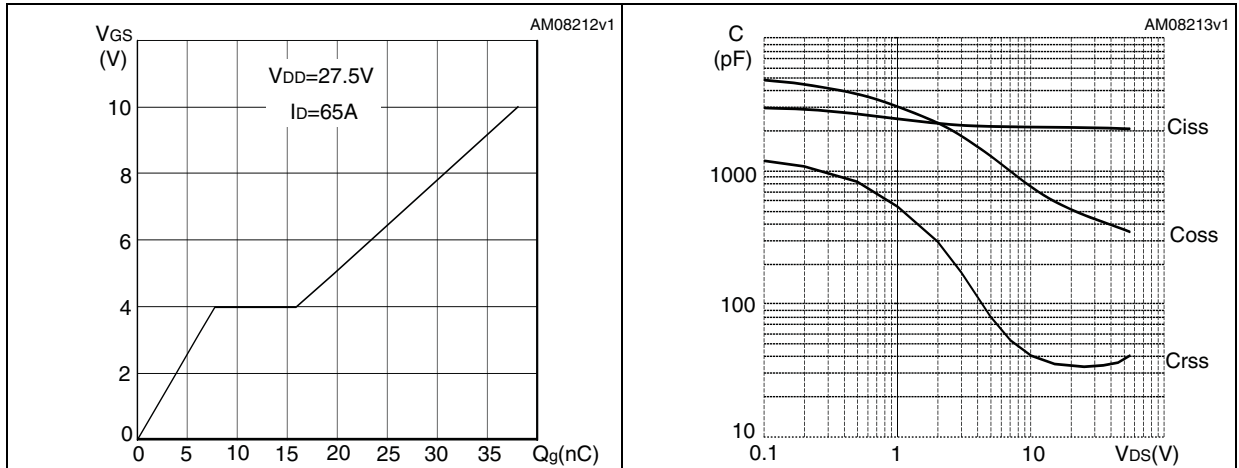


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

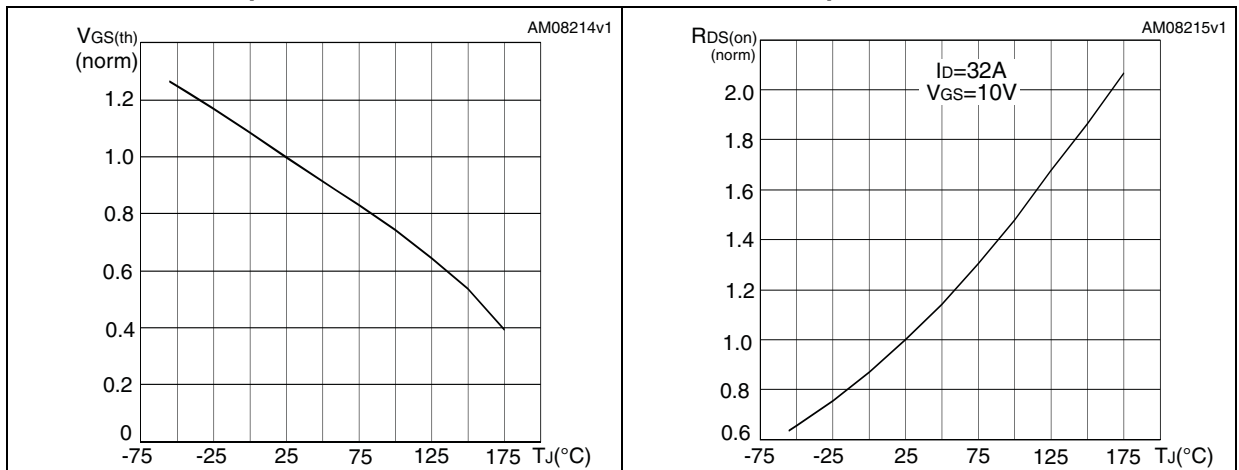
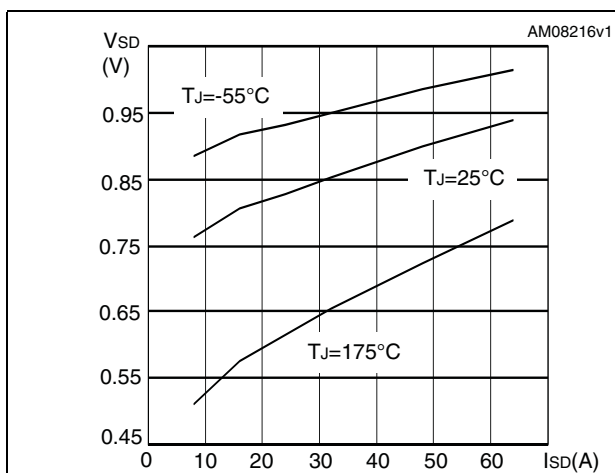


Figure 12. Source-drain diode forward characteristics



3 Test circuits

Figure 13. Switching times test circuit for resistive load

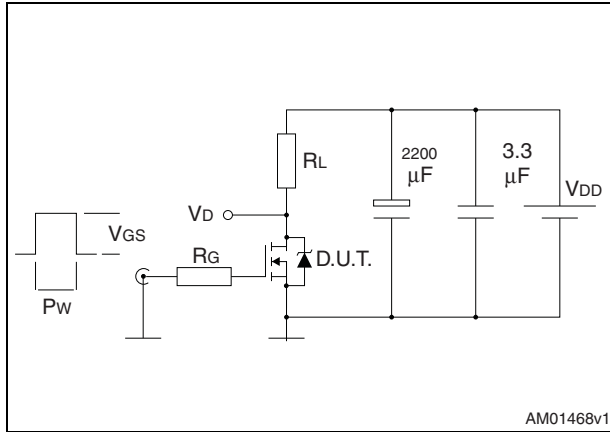


Figure 14. Gate charge test circuit

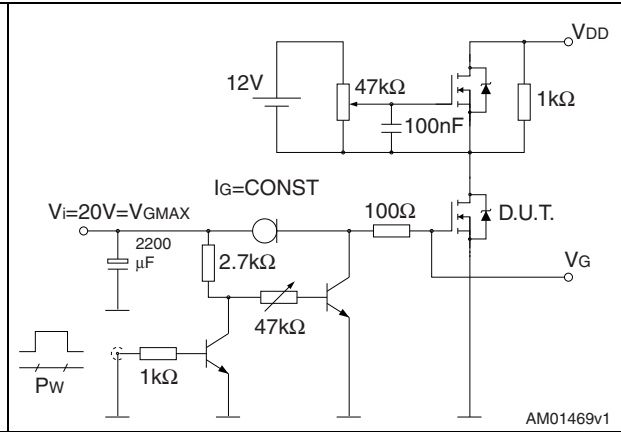


Figure 15. Test circuit for inductive load switching and diode recovery times

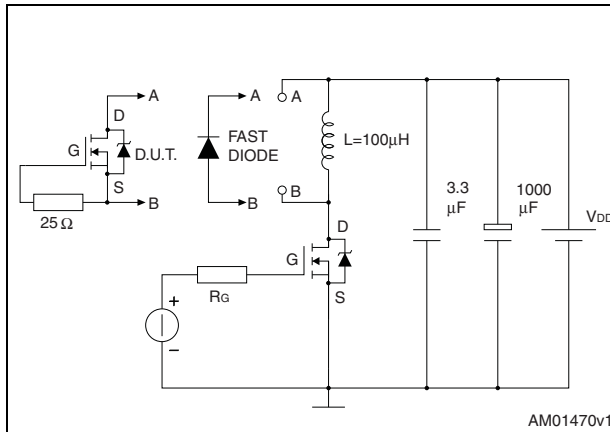


Figure 16. Unclamped inductive load test circuit

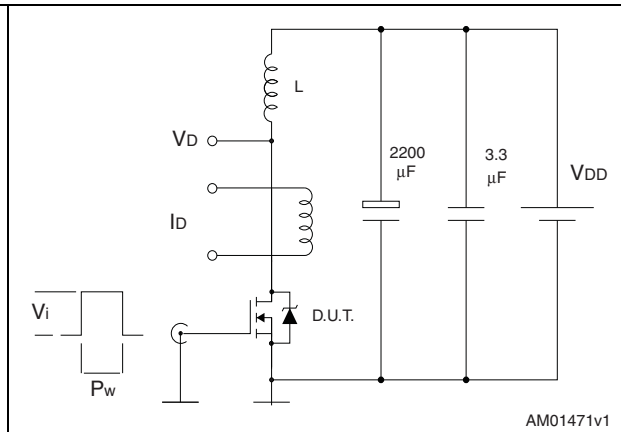


Figure 17. Unclamped inductive waveform

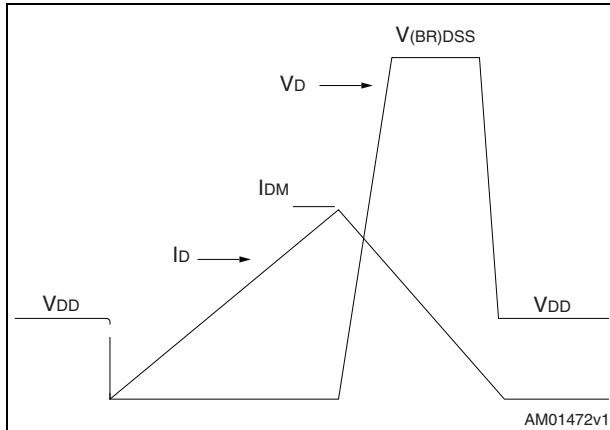
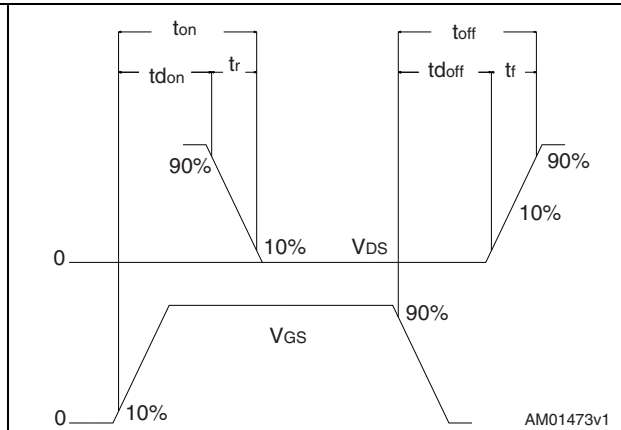


Figure 18. Switching time waveform

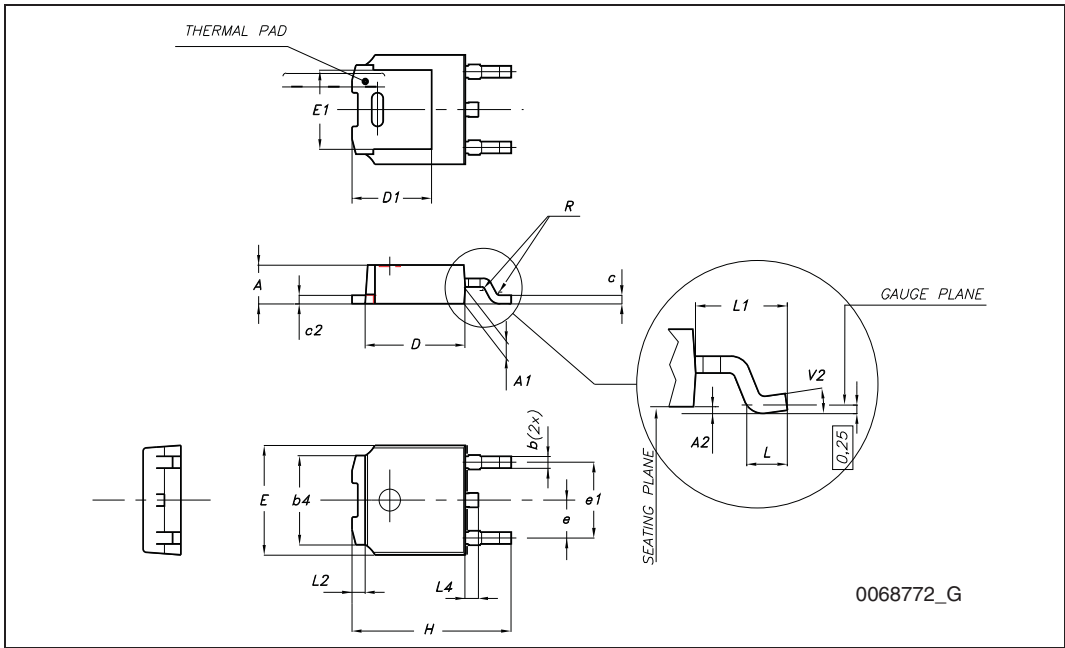


4 Package mechanical data

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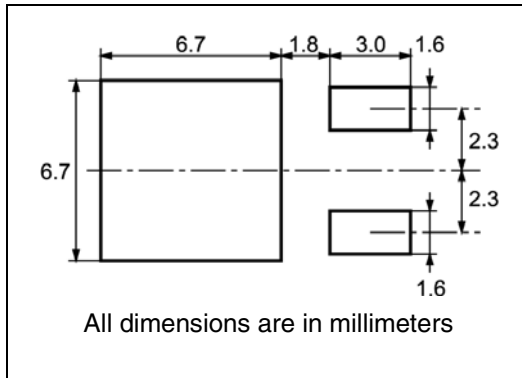
TO-252 (DPAK) mechanical data

DIM.	mm.		
	min.	typ	max.
A	2.20		2.40
A1	0.90		1.10
A2	0.03		0.23
b	0.64		0.90
b4	5.20		5.40
c	0.45		0.60
c2	0.48		0.60
D	6.00		6.20
D1		5.10	
E	6.40		6.60
E1		4.70	
e		2.28	
e1	4.40		4.60
H	9.35		10.10
L	1		
L1		2.80	
L2		0.80	
L4	0.60		1
R		0.20	
V2	0°		8°



5 Packaging mechanical data

DPAK FOOTPRINT



TAPE AND REEL SHIPMENT

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

6 Revision history

Table 8. Revision history

Date	Revision	Changes
20-Oct-2009	1	First release.
12-Oct-2010	2	Document status promoted from preliminary data to datasheet.

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