3A 500V N Channel MOSFET

Feactures

- Low RDS(on)
- Low gate charge (typ. Qg =7.2nC)
- 100% UIS tested
- RoHS compliant

Applications

- Power factor correction.
- Switched mode power supplies.
- LED driver.

Descriptions

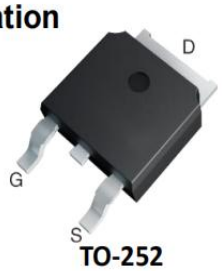
The Power MOSFET is fabricated using the advanced planar VDMOS technology.

The resulting device has low conduction resistance, superior switching performance and high avalanche energy.

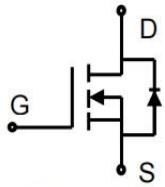
Product Summary

V_{DSS}	500V
I_D	3A
$R_{DS(on),max}$	3.6Ω
$Q_{g,typ}$	7.2nC

Pin Configuration



TO-252



N-Channel MOSFET

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-Source Voltage	VDSS	500	V
Continuous drain current 1) (TC = 25°C) (TC = 100°C)	ID	3 2	A A
Pulsed drain current 2)	IDM	9	A
Gate-Source voltage	VGSS	±30	V
Avalanche energy, single pulse 3)	EAS	42	mJ
Power Dissipation	PD	60	W
Operating and Storage Temperature Range	TJ, TSTG	-55 to +150	°C
Continuous diode forward current	IS	3	A
Diode pulse current	IS,pulse	9	A

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	RθJC	2.1	°C/W
Thermal Resistance, Junction-to-Ambient, minimal footprint 4)	RθJA	62	°C/W
Soldering temperature, wave soldering only allowed at leads. (1.6mm from case for 10s)	Tsold	260	°C

Electrical Characteristics(Ta=25℃)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static characteristics						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=0.25mA	400	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=0.25mA	2.0	-	4.0	V
Drain cut-off current	I_{DSS}	V_{DS}=500V, V_{GS}=0 V,T_j = 25°C	-	-	1	μA
Gate leakage current, Forward	I_{GSSF}	V_{GS}=30V, V_{DS}=0V	-	-	100	nA
Gate leakage current, Reverse	I_{GSSR}	V_{GS}=-30V, V_{DS}=0V	-	-	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=1.5A T_j = 25°C T_j = 150°C	 - -	 3.0 7.0	3.6	Ω
Dynamic characteristics						
Input capacitance	C_{iss}	V_{DS} = 25V, V_{GS} = 0 V, f = 250kHz	-	276	-	pF
Output capacitance	C_{oss}		-	27.4	-	
Reverse transfer capacitance	C_{rss}		-	0.94	-	
Turn-on delay time	$t_{d(on)}$	V_{DD} = 250V, I_D = 3A R_G = 10Ω, V_{GS}=10V	-	8.6	-	ns
Rise time	t_r		-	31	-	
Turn-off delay time	$t_{d(off)}$		-	12.5	-	
Fall time	t_f		-	8.3	-	
Gate charge characteristics						
Gate to source charge	Q_{gs}	V_{DD}=400V, I_D=3A V_{GS}=0 to 10V	-	1.5	-	nC
Gate to drain charge	Q_{gd}		-	3.8	-	
Gate charge total	Q_g		-	7.2	-	
Gate plateau voltage	$V_{plateau}$		-	5.5	-	V
Reverse diode characteristics						
Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=3A	-	-	1.3	V
Reverse recovery time	t_{rr}	V_R=400V, I_F=3A, dI_F/dt=100 A/μs	-	209	-	ns
Reverse recovery charge	Q_{rr}		-	858	-	nC
Peak reverse recovery current	I_{rrm}		-	5.7	-	A

Notes:

1. Drain current limited by maximum junction temperature.
2. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. I_{AS}=2.9A, L=10mH, V_{DD}=60V, Starting T_j= 25℃.
4. The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Electrical Characteristic Curve (Tc=25° C unless otherwise noted)

Figure 1. Typ. Output Characteristics

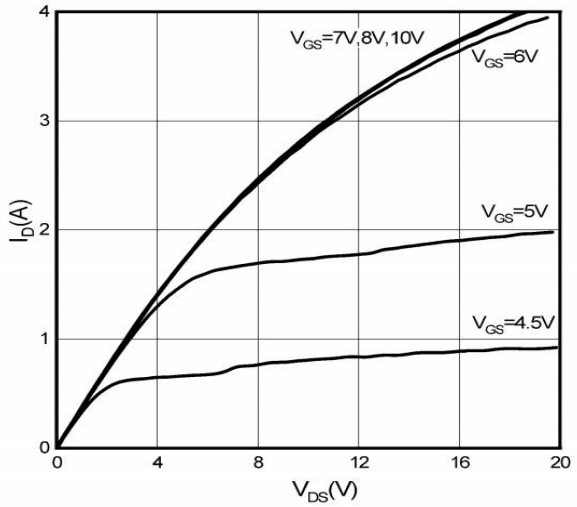


Figure 2. Transfer Characteristics

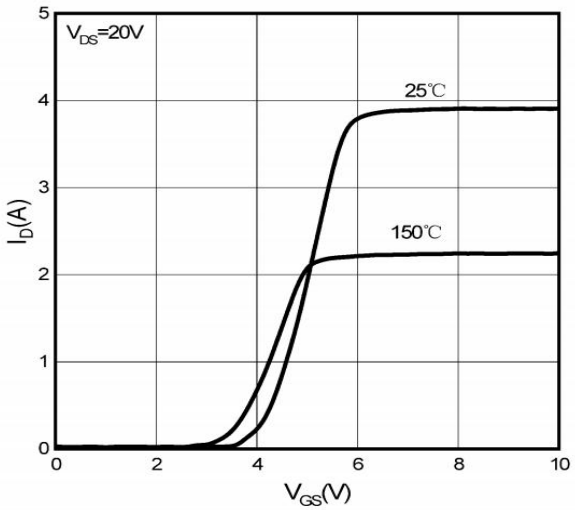


Figure 3. On-Resistance vs. Drain Current

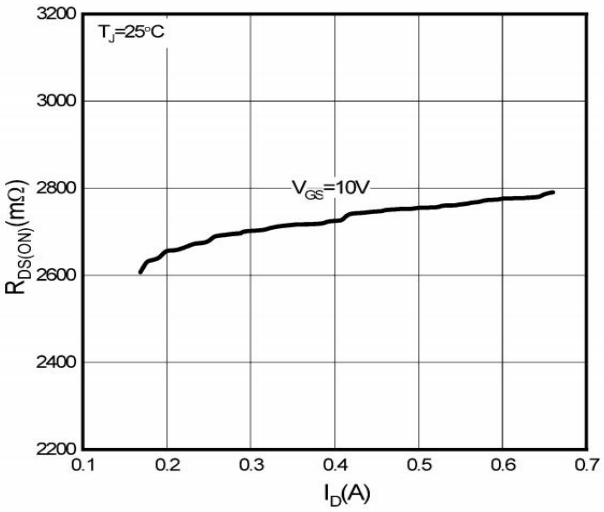


Figure 4.On-Resistance vs.Temperature

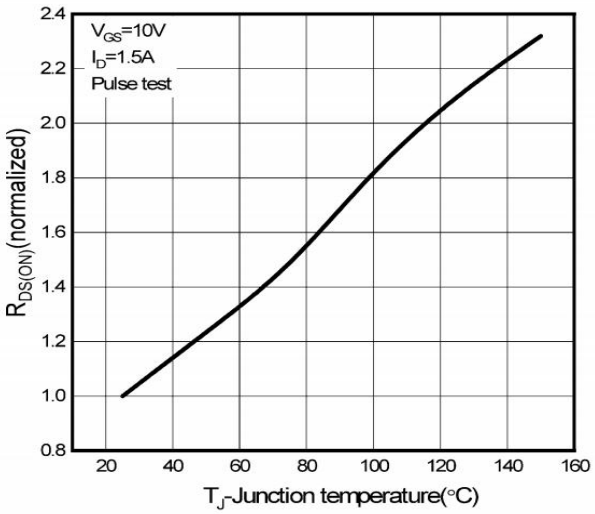


Figure 5.Breakdown Voltage vs.Temperature

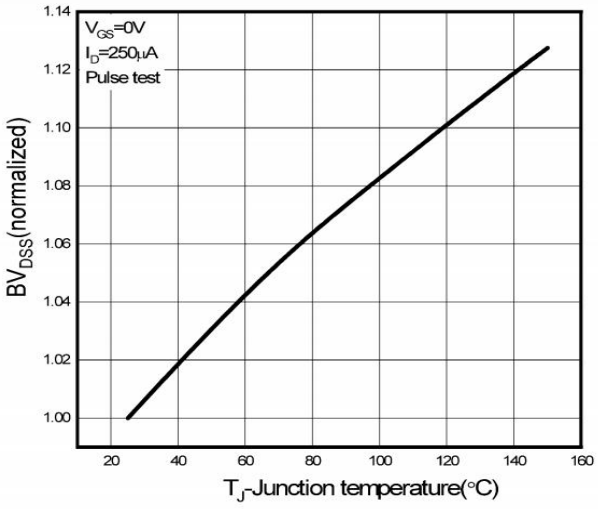
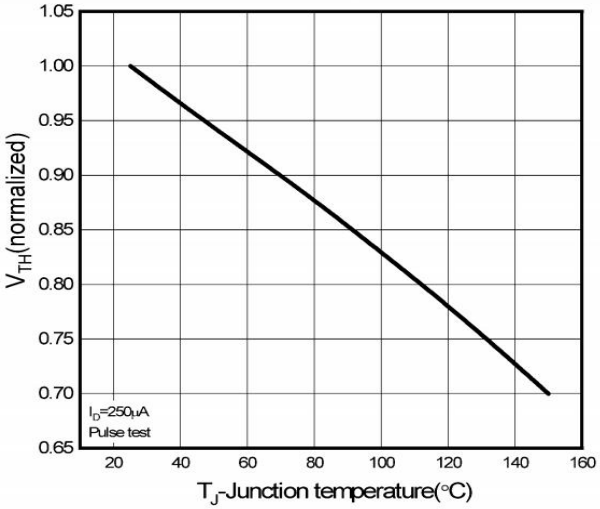


Figure 6.Threshold Voltage vs.Temperature



Electrical Characteristic Curve (Tc=25° C unless otherwise noted)

Figure 7.Rds(on) vs. Gate Voltage

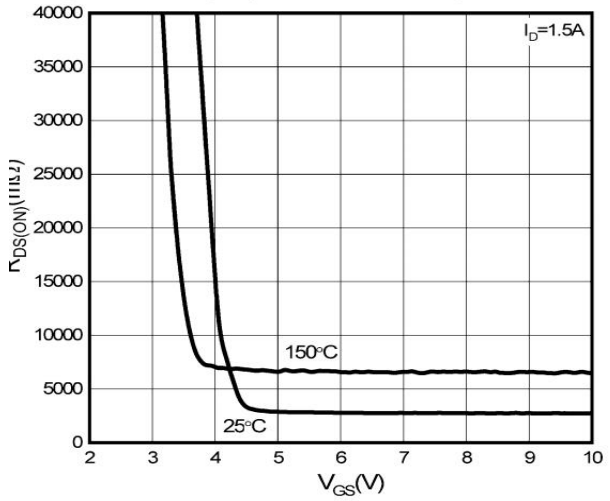


Figure 8.Body-Diode Characteristics

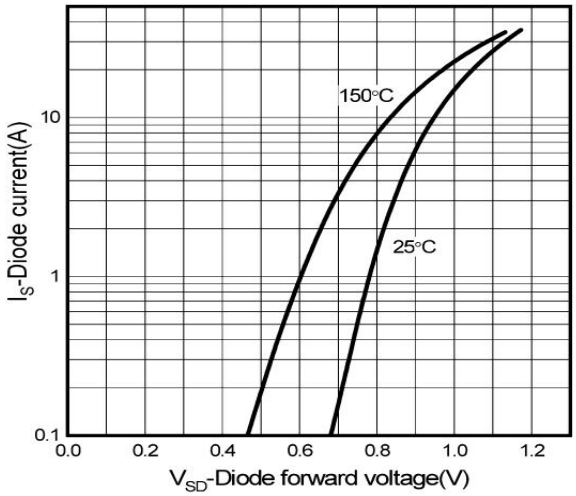


Figure 9.Capacitance Characteristics

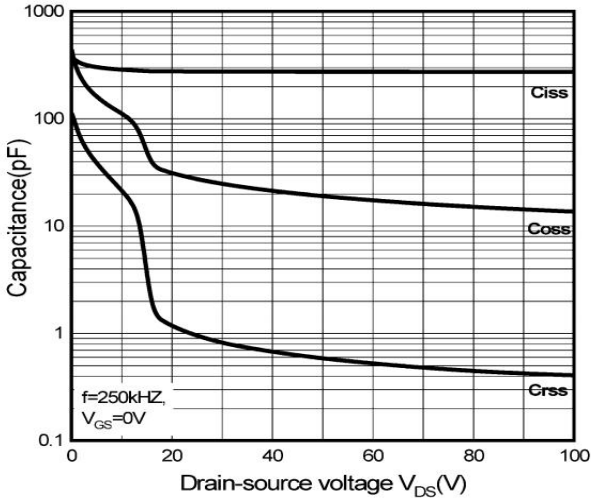


Figure 10.Gate Charge Characteristics

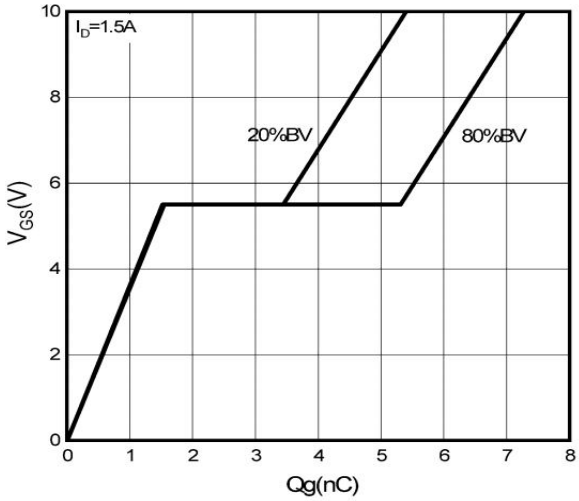


Figure 11.Drain Current Derating

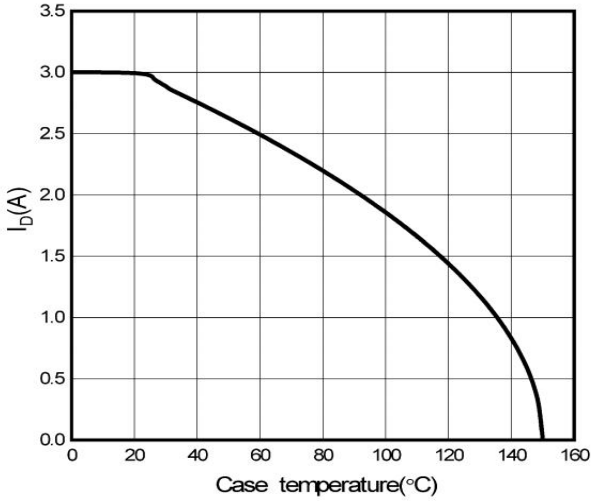
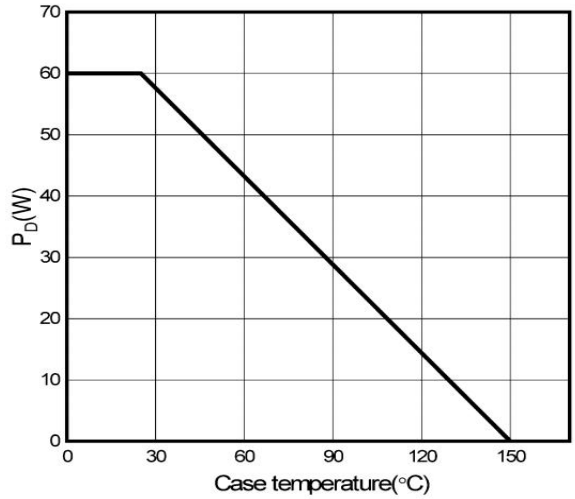


Figure 12.Power Dissipation vs.Temperature



Electrical Characteristic Curve (Tc=25° C unless otherwise noted)

Figure 13. Safe Operating Area

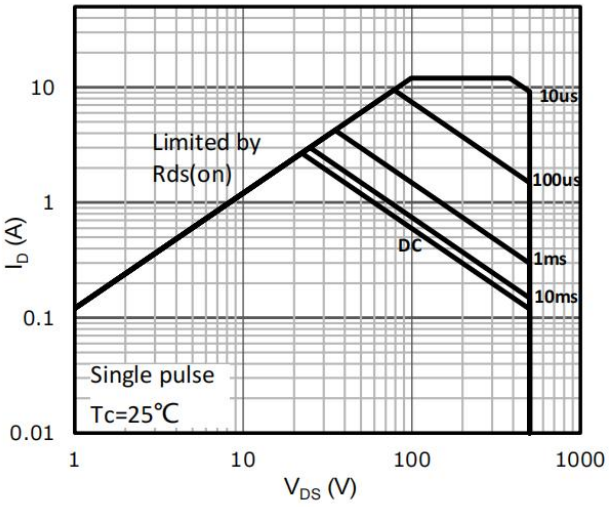
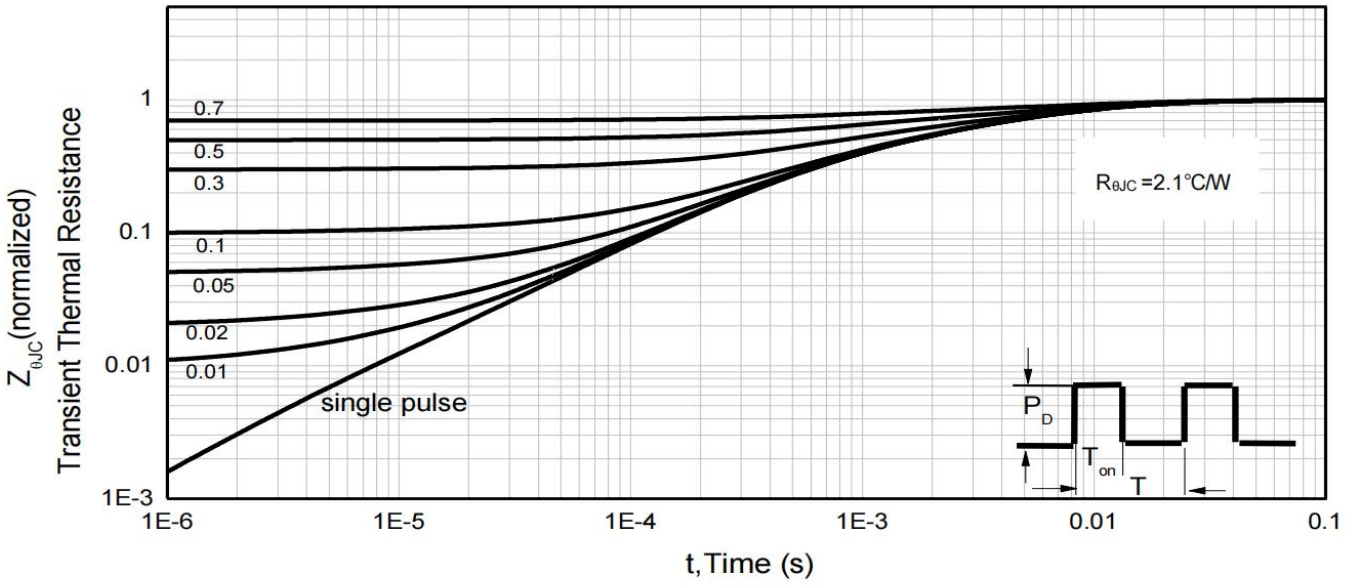
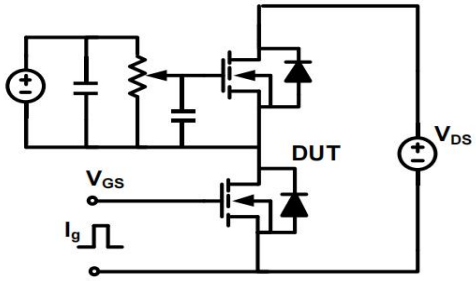


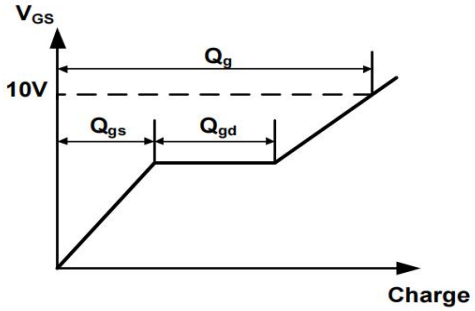
Figure 14. Normalized Maximum Transient Thermal Impedance (R_{thJC})



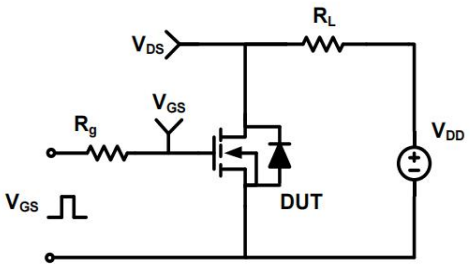
Test Circuit & Waveforms

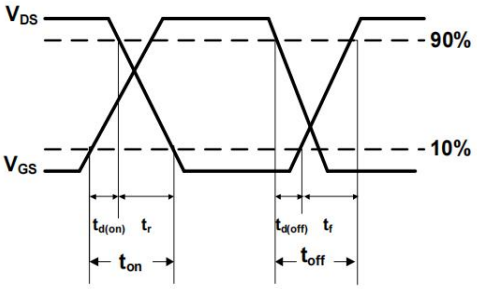
Gate Charge Test Circuit & Waveform



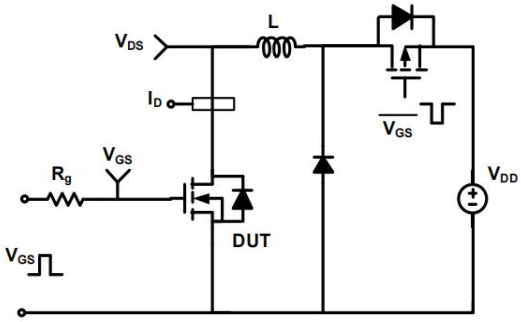


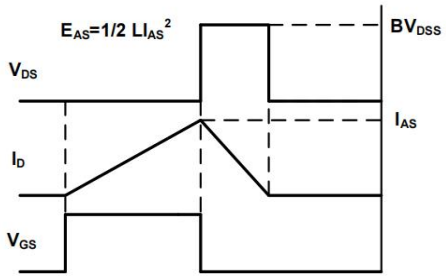
Resistive Switching Test Circuit & Waveform



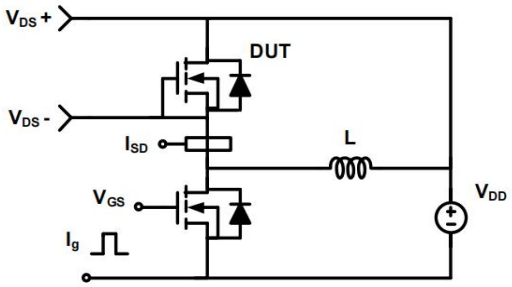


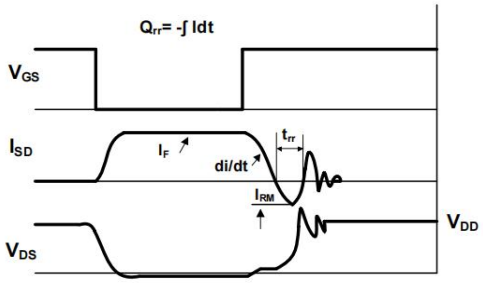
Unclamped Inductive Switching (UIS) Test Circuit & Waveform



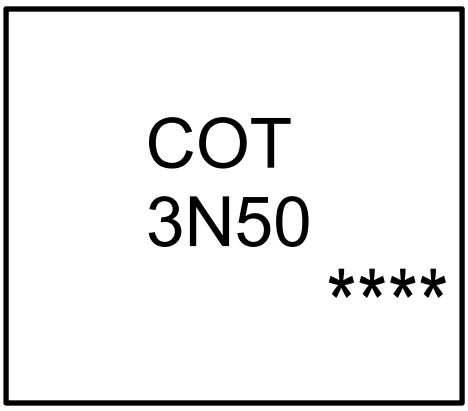


Diode Recovery Test Circuit & Waveform





Marking Instructions



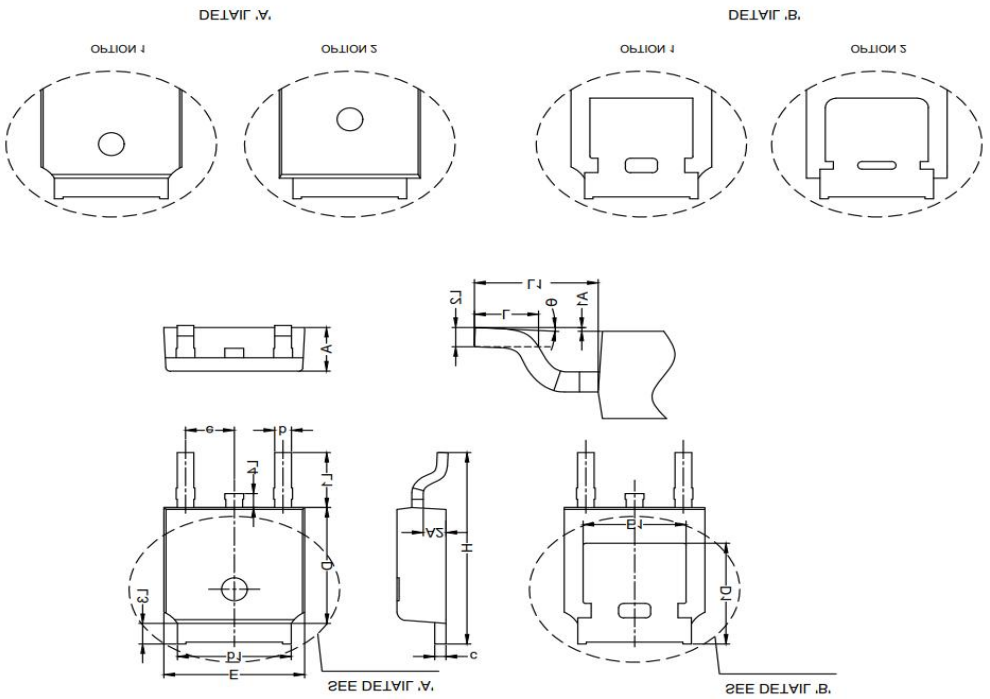
Note:

COT:	Company Logo
3N50:	Product Type.
****:	Lot No. Code, code change with Lot No.

Package Marking and Ordering Information

Device	Device Package	Marking	Units/Reel
CT3N50D	TO-252	3N50	2500

Package Outline Dimensions



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.10	2.50	0.083	0.098
A1	0.00	0.20	0.000	0.008
A2	0.85	1.17	0.033	0.046
b	0.60	0.90	0.024	0.035
b1	4.95	5.48	0.195	0.216
c	0.41	0.61	0.016	0.024
D	5.95	6.35	0.234	0.250
D1	5.21	-	0.205	-
E	6.35	6.80	0.250	0.268
E1	4.32	-	0.170	-
e	2.286 BSC		0.090 BSC	
H	9.40	10.50	0.370	0.413
L	0.95	1.78	0.037	0.070
L1	2.90 REF		0.114 REF	
L2	0.51 BSC		0.020 BSC	
L3	0.88	1.28	0.035	0.050
L4	-	1.02	-	0.040
θ	0°	10°	0°	10°