

## Features

- 650V, 8A  
 $R_{DS(ON)} < 0.6\Omega$  @  $V_{GS} = 10V$
- Advanced Split Gate Trench Technology
- Excellent  $R_{DS(ON)}$  and Low Gate Charge
- Lead free product is acquired

## Product Summary



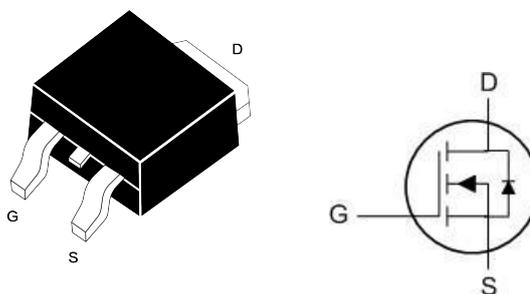
BVDSS	RDS(ON)	ID
650V	0.5 $\Omega$	8A

## Application

- Load Switch
- PWM Application
- Power management

*100% UIS TESTED!*  
*100%  $\Delta V_{ds}$  TESTED!*

## TO-252 Pin Configuration



## Absolute Maximum Ratings

Parameter	Sym			Unit
Drain-source voltage	$V_{DSS}$	650		V
Continuous drain current <sup>1)</sup> ( $T_C = 25^\circ C$ )	$I_D$	8		A
		4.8		A
Pulsed drain current <sup>2)</sup>	$I_{DM}$	19		A
Gate-source voltage	$V_{GS}$	$\pm 30$		V
Avalanche energy, single pulse <sup>3)</sup>	$E_{AS}$	45		mJ
Avalanche energy, repetitive <sup>2)</sup>	$E_{AR}$	0.15		mJ
Avalanche current, repetitive <sup>2)</sup>	$I_{AR}$	1.0		A
Power dissipation ( $T_C = 25^\circ C$ ) - Derate above $25^\circ C$	$P_D$	57	27	W
		0.46	0.22	W/ $^\circ C$
Operating and storage temperature range	$T_j, T_{stg}$	-55 to +150		$^\circ C$
Continuous diode forward current	$I_S$	8		A
Diode pulse current	$I_{S,pulse}$	19		A

## Thermal Characteristics

Parameter	Sym			Unit
Thermal resistance, junction-to-case	$R_{\theta JC}$	2.2	4.6	$^\circ C/W$
Thermal resistance, junction-to-ambient	$R_{\theta JA}$	62	80	$^\circ C/W$

### Electrical Characteristics T<sub>c</sub> = 25°C, unless otherwise noted

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static characteristics</b>						
Drain-source breakdown voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =0.25 mA	650	-	-	V
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =0.25mA	2	3	4	V
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> =650 V, V <sub>GS</sub> =0V, T <sub>j</sub> = 25°C T <sub>j</sub> = 125°C	- -	- 30	1 -	μA
Gate leakage current, forward	I <sub>GSSF</sub>	V <sub>GS</sub> =20V, V <sub>DS</sub> =0V	-	-	100	nA
Gate leakage current, reverse	I <sub>GSSR</sub>	V <sub>GS</sub> =-20V, V <sub>DS</sub> =0V	-	-	-100	nA
Drain-source on-state resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10 V, I <sub>D</sub> =1.5A T <sub>j</sub> = 25°C	- -	0.5	0.6	Ω
<b>Dynamic characteristics</b>						
Input capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 100V, V <sub>GS</sub> = 0V, f = 1 MHz	-	415	-	pF
Output capacitance	C <sub>OSS</sub>		-	19	-	
Reverse transfer capacitance	C <sub>RSS</sub>		-	0.95	-	
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = 300V, I <sub>D</sub> = 2A R <sub>G</sub> = 25Ω, V <sub>GS</sub> =10V	-	12	-	ns
Rise time	t <sub>r</sub>		-	10	-	
Turn-off delay time	t <sub>d(off)</sub>		-	62	-	
Fall time	t <sub>f</sub>		-	13	-	
<b>Gate charge characteristics</b>						
Gate to source charge	Q <sub>gs</sub>	V <sub>DD</sub> =480V, I <sub>D</sub> =2A, V <sub>GS</sub> =0 to 10V	-	1.7	-	nC
Gate to drain charge	Q <sub>gd</sub>		-	3.5	-	
Gate charge total	Q <sub>g</sub>		-	9.6	-	
Gate plateau voltage	V <sub>plateau</sub>		-	5.2	-	V
<b>Reverse diode characteristics</b>						
Diode forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0 V, I <sub>F</sub> =1.5A	-	-	1.2	V
Reverse recovery time	t <sub>rr</sub>	V <sub>R</sub> =50V, I <sub>F</sub> =2A, dI <sub>F</sub> /dt=100A/μs	-	105	-	ns
Reverse recovery charge	Q <sub>rr</sub>		-	0.6	-	μC
Peak reverse recovery current	I <sub>rrm</sub>		-	11.3	-	A

#### Notes:

- Limited by T<sub>j max</sub>. Maximum duty cycle D=0.5.
- Repetitive rating: pulse width limited by maximum junction temperature.
- I<sub>AS</sub> = 1.0 A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, starting T<sub>j</sub> = 25°C.

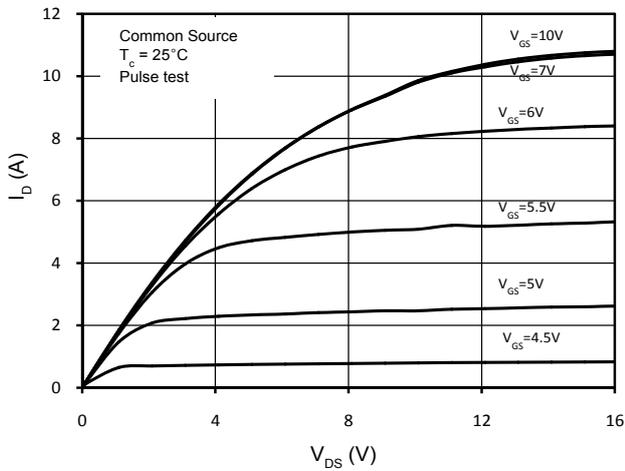


Figure 1. On-Region Characteristics

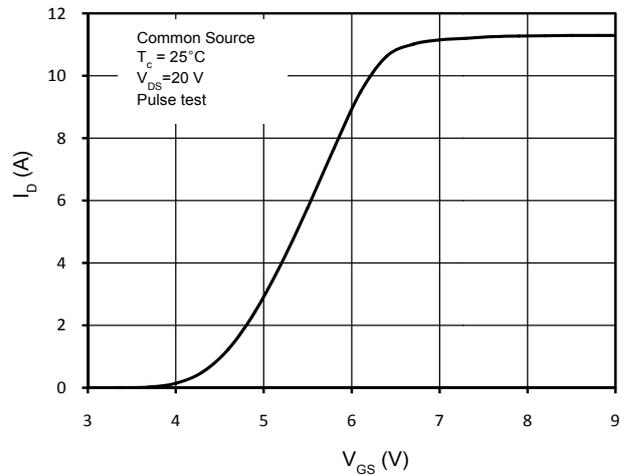


Figure 2. Transfer Characteristics

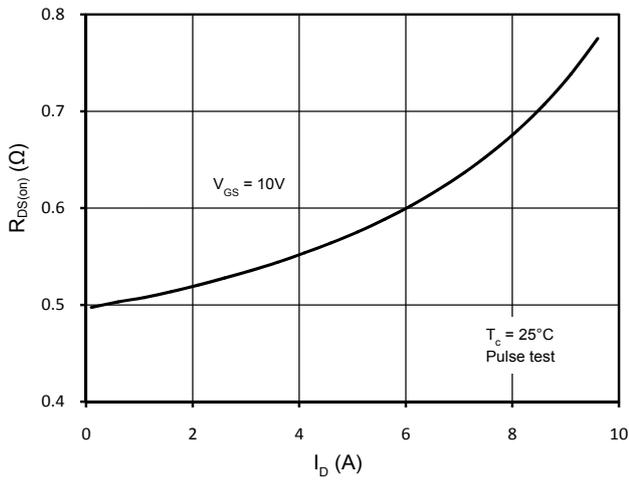


Figure 3. Static Drain-Source On Resistance

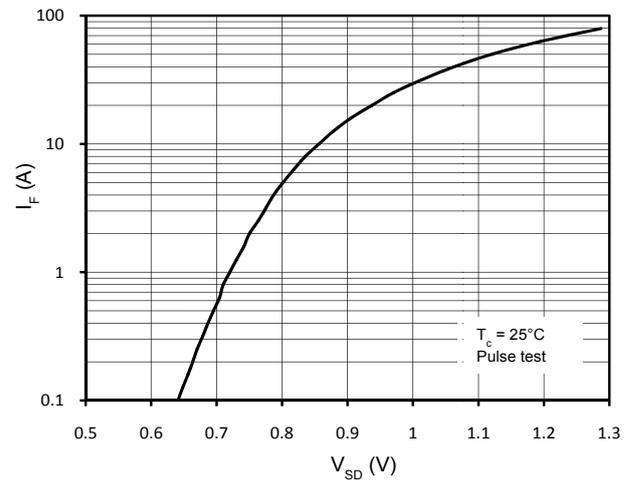


Figure 4. Body-Diode Forward Characteristics

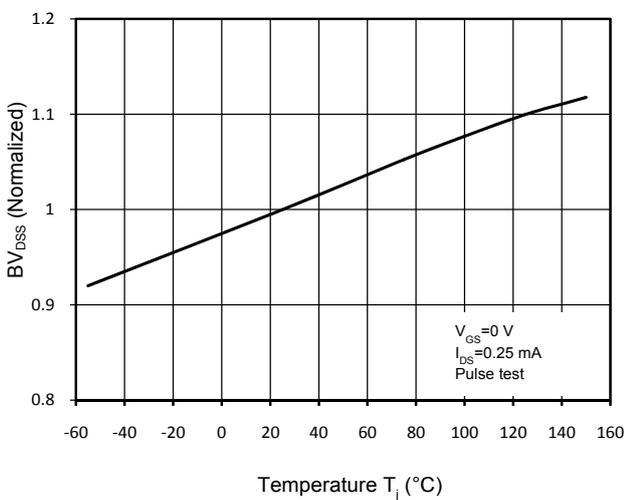


Figure 5. Normalized  $BV_{DS}$  vs. Temperature

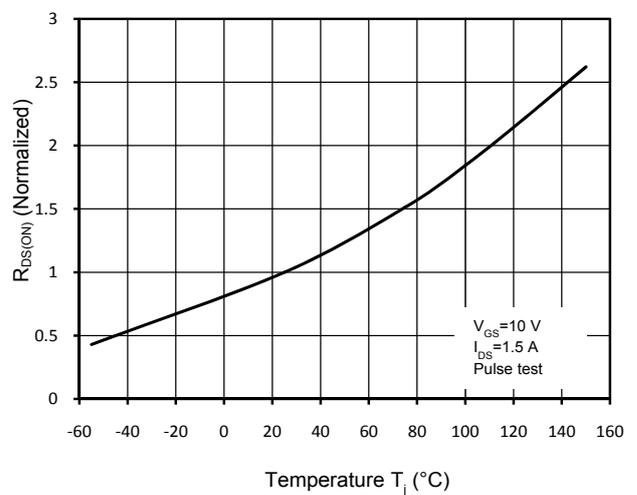


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

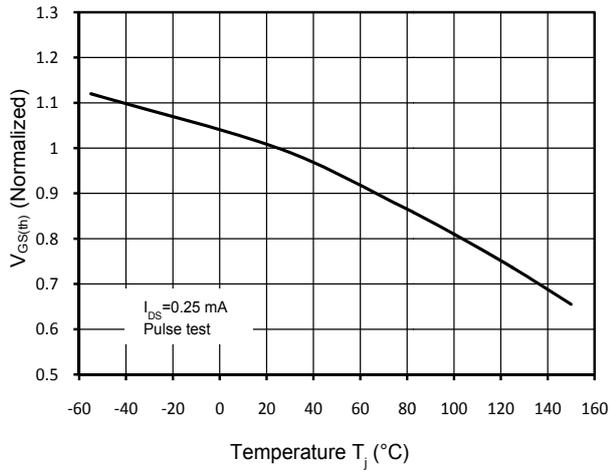


Figure 7. Threshold Voltage vs. Temperature

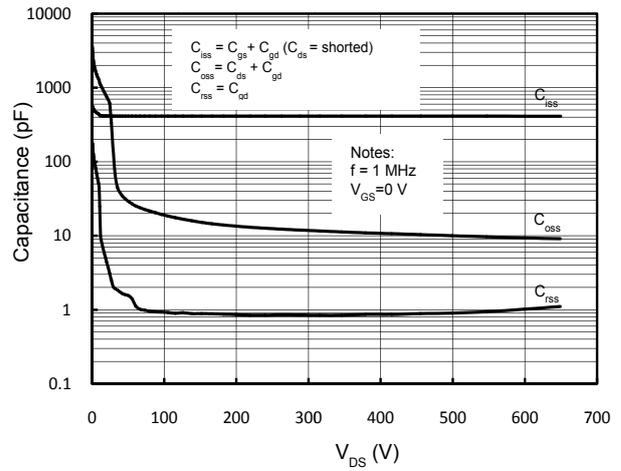


Figure 8. Capacitance Characteristics

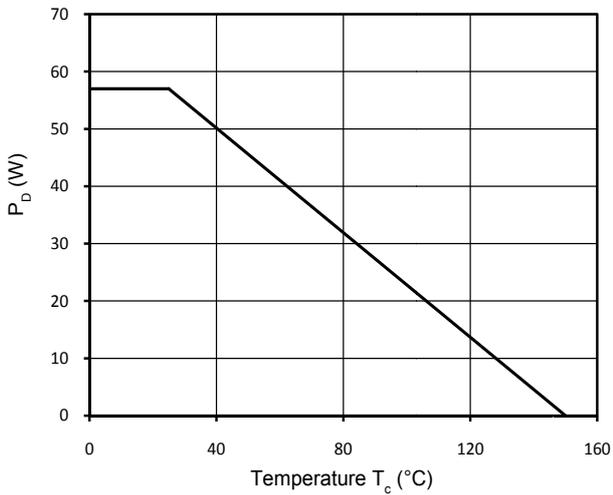


Figure 9. Power Dissipation

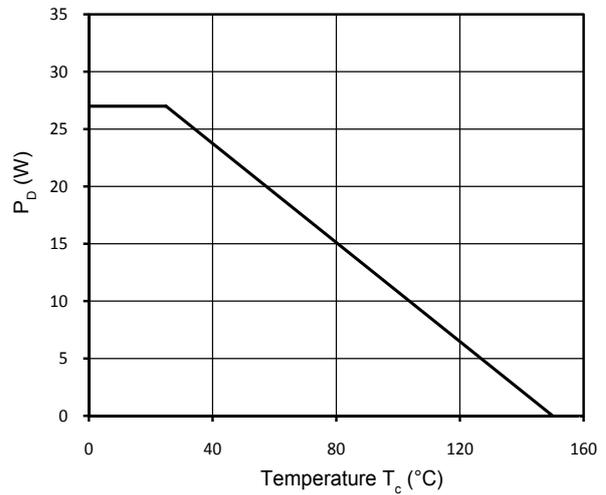


Figure 10. Power Dissipation (TO-220F)

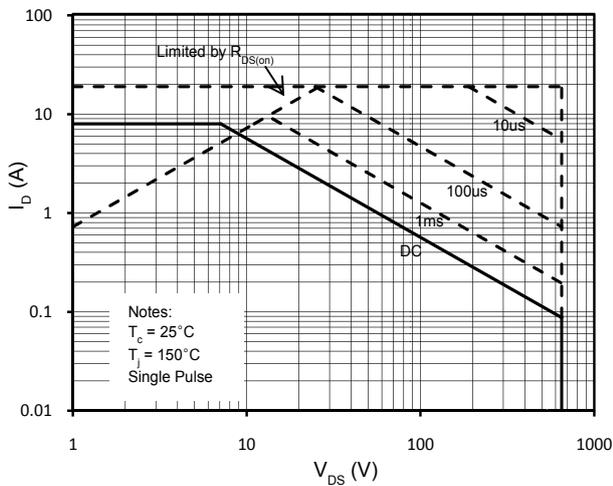


Figure 11. Maximum Safe Operating Area

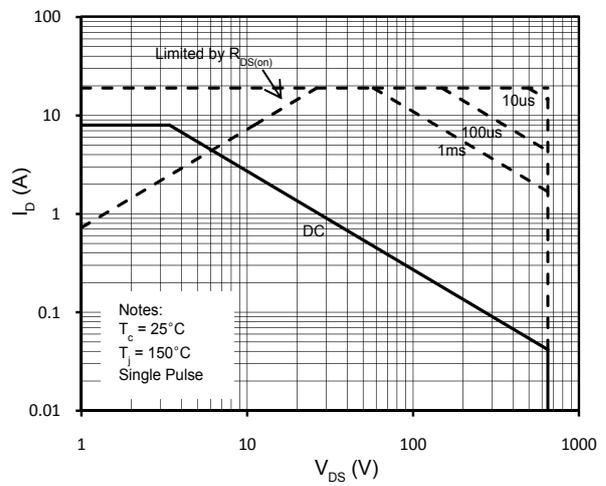


Figure 12. Maximum Safe Operating Area (TO-252)

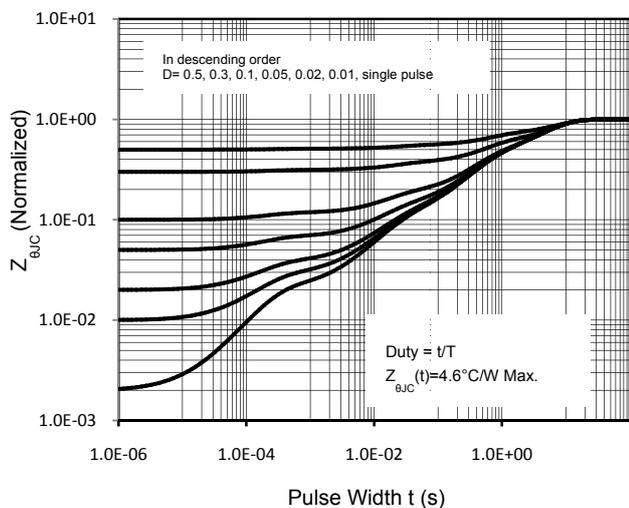


Figure 13. Transient Thermal Response Curve (TO-220F)

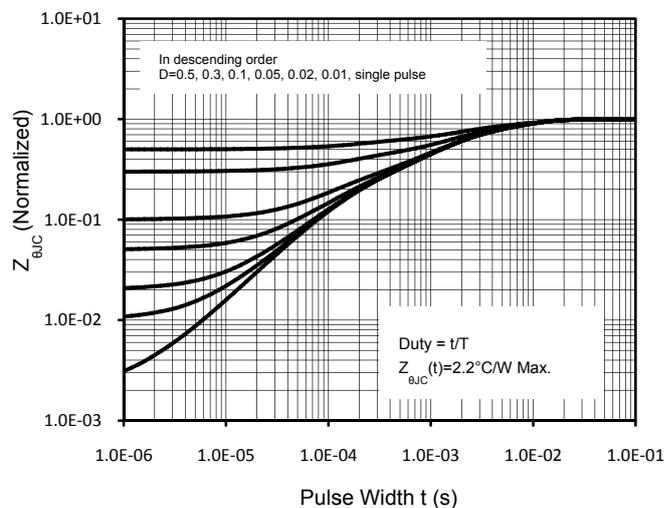


Figure 14. Transient Thermal Response Curve

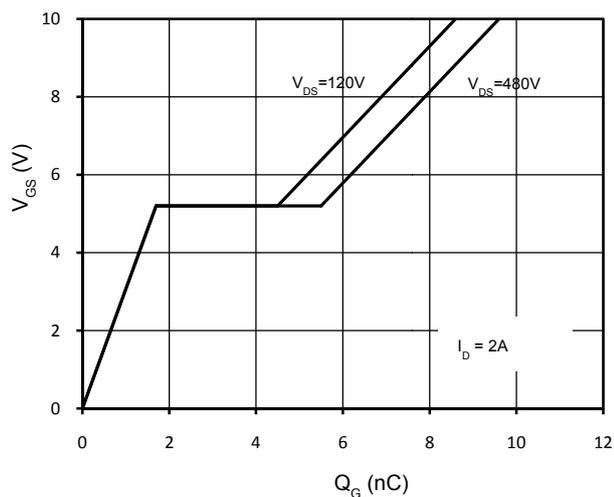
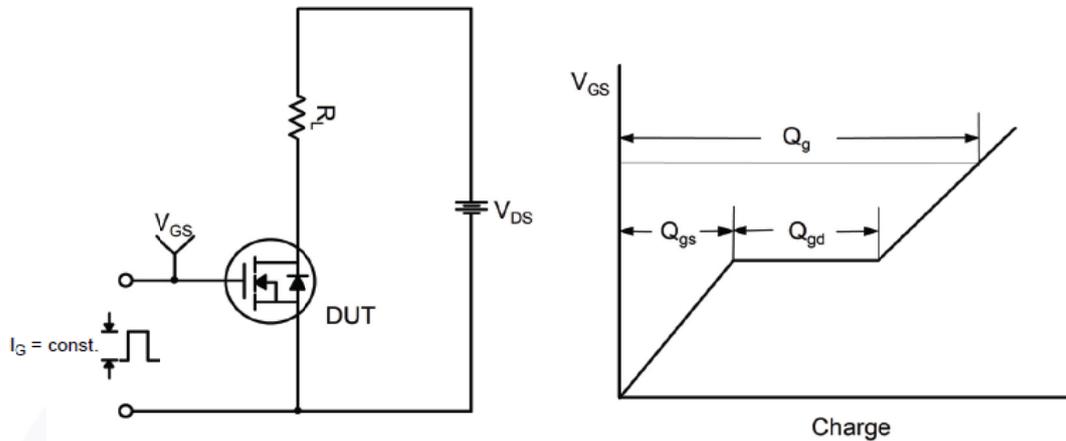
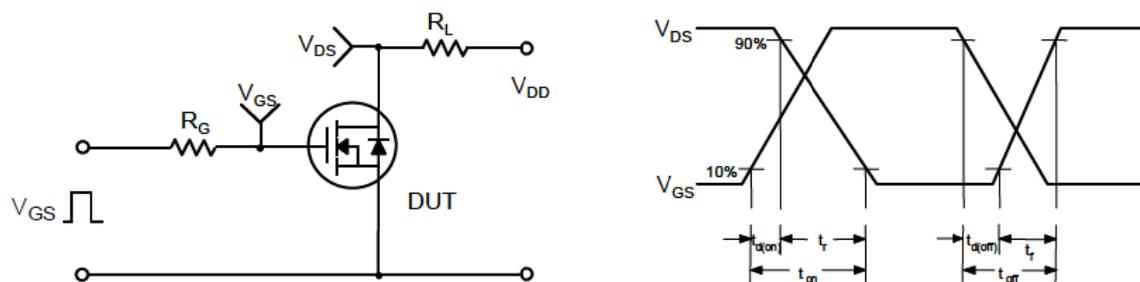


Figure 15. Gate Charge Characteristics

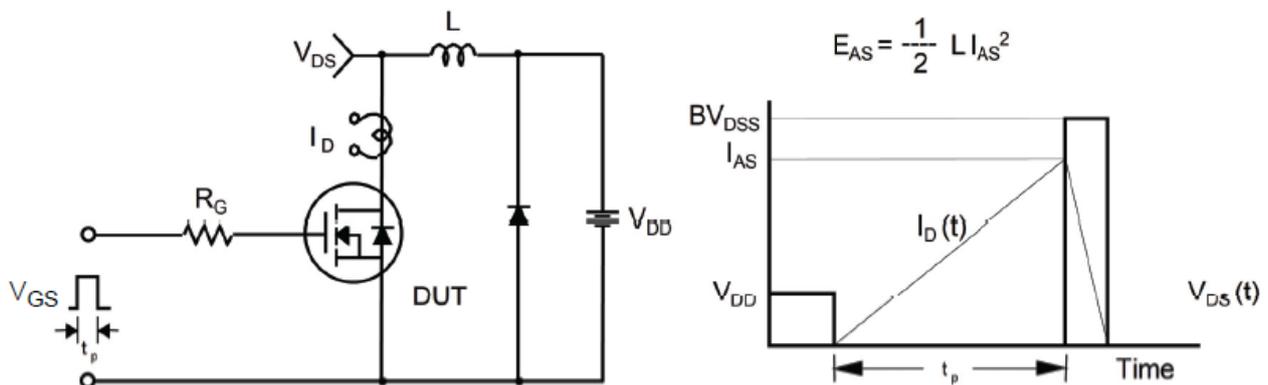
### Gate Charge Test Circuit & Waveform



### Switching Test Circuit & Waveforms

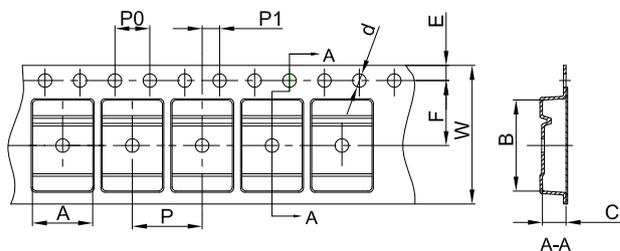


### Unclamped Inductive Switching Test Circuit & Waveforms



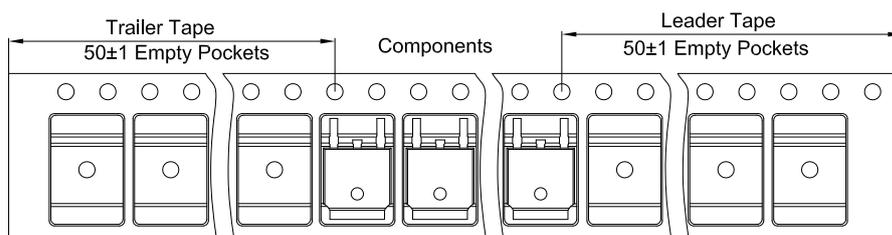
## TO-252-2L Tape and Reel

### TO-252 Embossed Carrier Tape

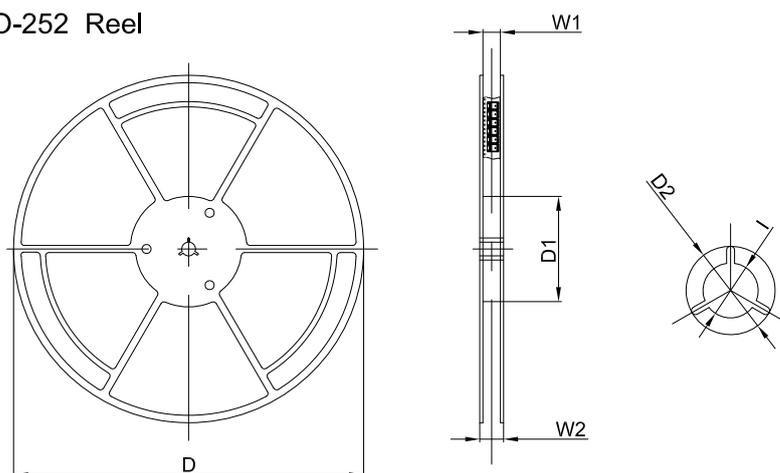


Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00

### TO-252 Tape Leader and Trailer

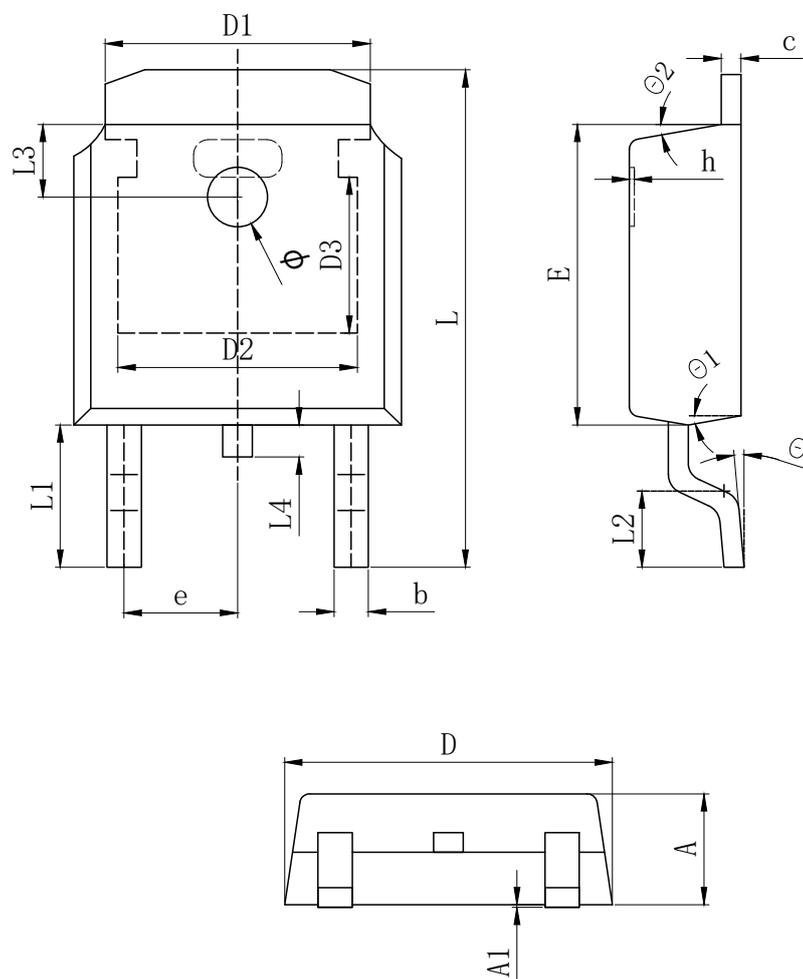


### TO-252 Reel



Dimensions are in millimeter						
Reel Option	D	D1	D2	W1	W2	I
13"Dia	330.00	100.00	Ø21.00	16.40	21.00	Ø13.00

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
2,500 pcs	13inch	2,500 pcs	340×336×29	25,000 pcs	353×346×365	



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c (电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
phi	1.100	1.200	1.300
theta	0°		8°
theta 1	9° TYP		
theta 2	9° TYP		

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