

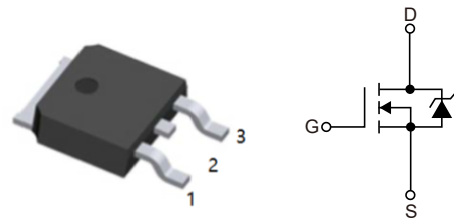
1.Features

- $V_{DS(V)}=60V$
- $R_{DS(ON)}<63m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<71m\Omega(V_{GS}=5V)$
- Ultra Low On-Resistance
- Peak Current vs Pulse Width Curve
- UIS Rating Curve
- Switching Time vs R_{GS} Curves

2.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	SOURCE
3	S	DRAIN

TO-252(DPAK)
top view



3.Absolute Maximum Ratings $T_c=25^{\circ}C$

Parameter	Symbol	Value	Units
Drain to Source Voltage (Note 1)	V_{DS}	60	V
Drain to Gate Voltage ($R_{GS}=20k\Omega$)(Note 1)	V_{DGR}	60	V
Gate to Source Voltage	V_{GS}	± 16	V
Drain Current - Continuous ($T_c=25^{\circ}C$, $V_{GS}=5V$)	I_D	17	A
- Continuous ($T_c=25^{\circ}C$, $V_{GS}=10V$) (Figure 2)		18	A
- Continuous ($T_c=135^{\circ}C$, $V_{GS}=5V$)		8	A
- Continuous ($T_c=135^{\circ}C$, $V_{GS}=4.5V$) (Figure 2)		8	A
Pulsed Drain Current	I_{DM}	Figure 4	
Pulsed Avalanche Rating	UIS	Figures 6, 17, 18	
Power Dissipation	P_D	49	W
Derate Above $25^{\circ}C$		0.327	W/ $^{\circ}C$



Storage Temperature	T_J, T_{STG}	-55 to 175	°C
Maximum Temperature for Soldering			
Leads at 0.063in (1.6mm) from Case for 10s	T_L	300	°C
Package Body for 10s, See Techbrief TB334	T_{pkg}	260	°C

Notes:

1. T_J =25°C to 150°C.

CAUTION: Stresses above those listed in “Absolute Maximum Ratings” may cause permanent damage to the device.

This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.



6. Electrical Characteristic (T_c=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain to Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V, Figure 12	60			V
		I _D =250μA, V _{GS} =0V, T _C =-40°C	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =55V, V _{GS} =0V			1	μA
		V _{DS} =50V, V _{GS} =0V, T _C =150°C			250	μA
Gate to Source Leakage Current	I _{GSS}	V _{GS} =±16V			±100	nA
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA, Figure 11	1		2.1	V
Drain to Source On Resistance	R _{DS(ON)}	I _D =18A, V _{GS} =10V, Figure 9,10		52	63	mΩ
		I _D =8A, V _{GS} =5V, Figure 9		60	71	mΩ
		I _D =8A, V _{GS} =4.5V, Figure 9		64	75	mΩ
Thermal Resistance Junction to Case	R _{θJC}	TO-252AA			3.06	°C/W
Thermal Resistance Junction to Ambient	R _{θJA}				100	°C/W
Turn-On Time	t _(on)	V _{DD} =30V, I _D =8A V _{GS} =4.5V, R _{GS} =22Ω Figures 15, 21,22			153	ns
Turn-On Delay Time	t _{D(on)}			13		ns
Rise Time	t _r			89		ns
Turn-Off Delay Time	t _{D(off)}			22		ns
Fall Time	t _f			37		ns
Turn-Off Time	t _(off)				89	ns
Turn-On Time	t _(on)	V _{DD} =30V, I _D =18A V _{GS} =10V, R _{GS} =24Ω Figures 16, 21,22			59	ns
Turn-On Delay Time	t _{D(on)}			5.3		ns
Rise Time	t _r			34		ns
Turn-Off Delay Time	t _{D(off)}			41		ns
Fall Time	t _f			50		ns
Turn-Off Time	t _(off)				136	ns



Total Gate Charge	$Q_{g(tot)}$	$V_{GS}=0$ to 10V	$V_{DD}=30V$		12	15	nC
Gate Charge at 5V	$Q_{g(5)}$	$V_{GS}=0$ to 5V	$I_D=8A$		6.8	8.2	nC
Threshold Gate Charge	$Q_{g(th)}$	$V_{GS}=0$ to 1V	$I_{g(REF)}=1mA$		0.54	0.65	nC
Gate to Source Gate Charge	Q_{gs}	(Figures 14, 19, 20)			1.7		nC
Gate to Drain "Miller" Charge	Q_{gd}				3		nC
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$ (Figure 13)			485		pF
Output Capacitance	C_{oss}				130		pF
Reverse Transfer Capacitance	C_{rss}				28		pF
Source to Drain Diode Voltage	V_{SD}	$I_{SD}=8A$				1.25	V
		$I_{SD}=4A$				1	V
Reverse Recovery Time	t_{rr}	$I_{SD}=8A, dI_{SD}/dt=100A/\mu s$				70	ns
Reverse Recovered Charge	Q_{rr}	$I_{SD}=8A, dI_{SD}/dt=100A/\mu s$				165	nC



7.1 Typical characteristic

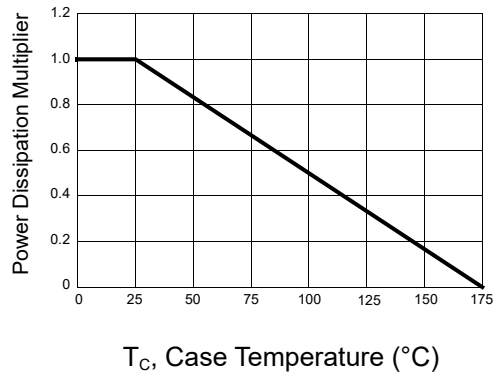


Figure 1: Normalized Power Dissipation vs Case Temperature

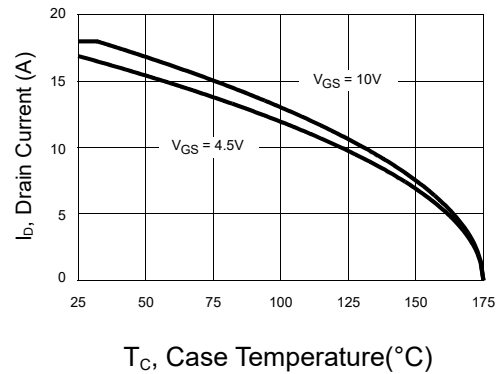


Figure 2: Maximum Continuous Drain Current vs Case Temperature

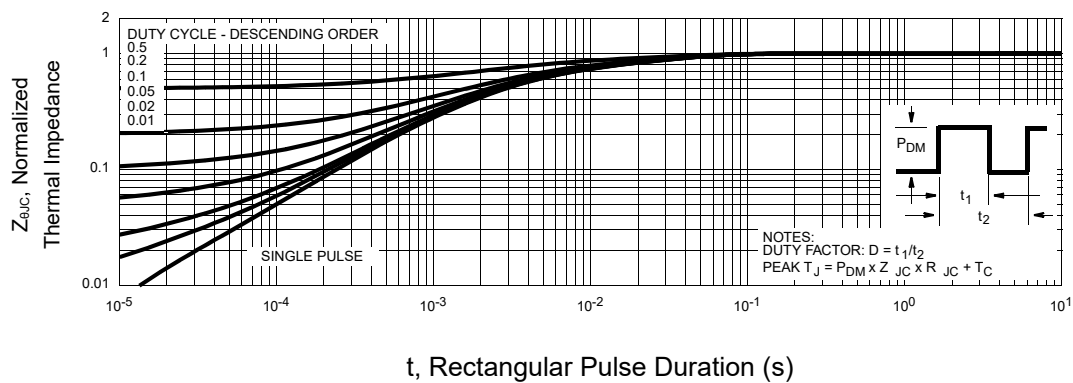


Figure 3: Normalized Maximum Transient Thermal Impedance

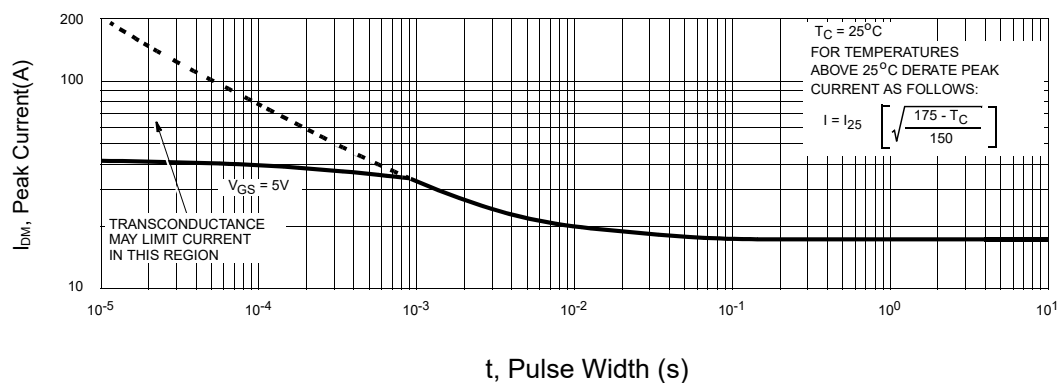


Figure 4: Peak Current Capability



7.2 Typical characteristic

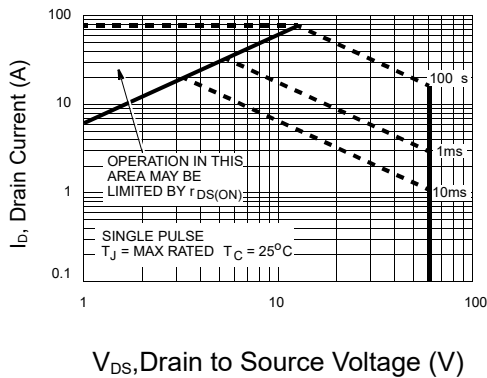


Figure 5: Forward Bias Safe Operating Area

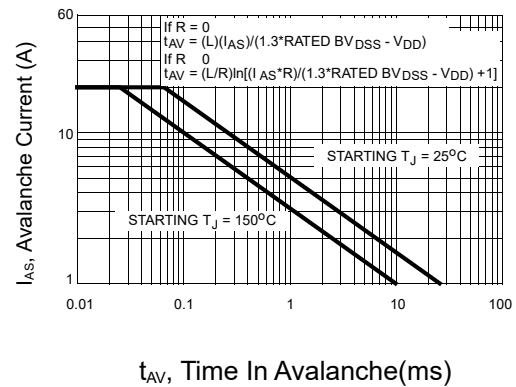


Figure 6: Unclamped Inductive Switching Capability

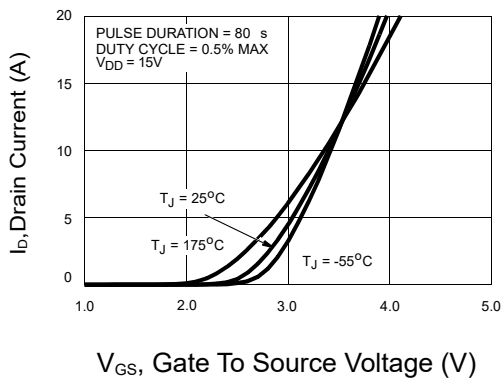


Figure 7: Transfer Characteristics

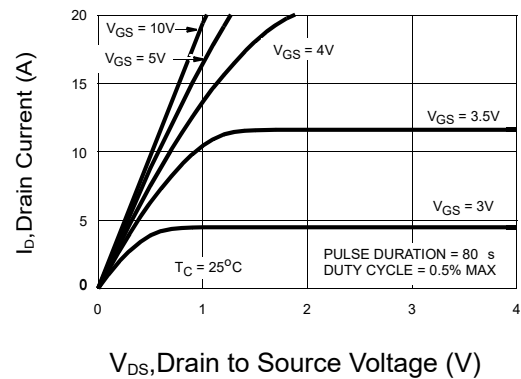


Figure 8: Saturation Characteristics

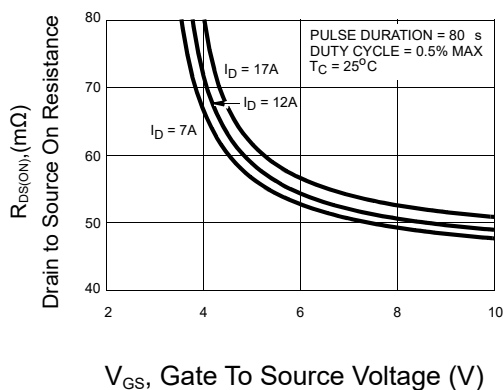


Figure 9: Drain To Source On Resistance Vs Gate Voltage And Drain Current

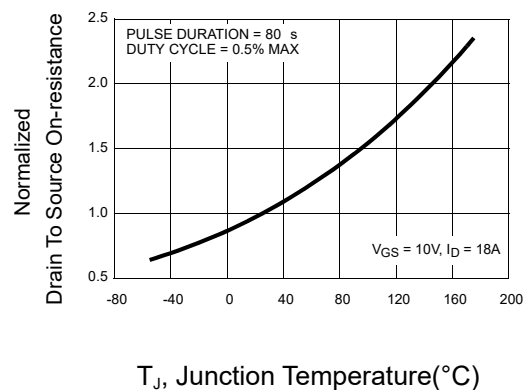


Figure 10: Normalized Drain to Source On Resistance vs Junction Temperature



7.3 Typical characteristic

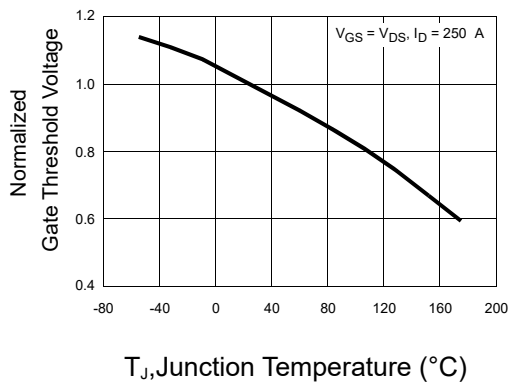


Figure 11: Normalized Gate Threshold Voltage Vs Junction Temperature

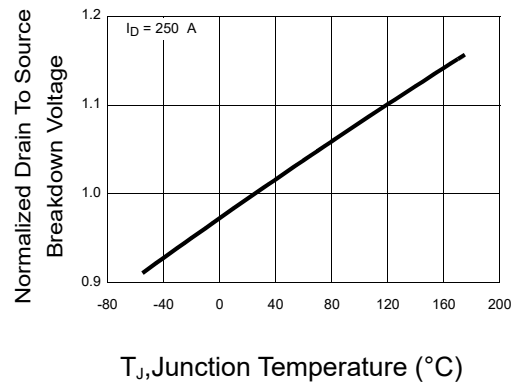


Figure 12: Normalized Drain To Source Breakdown Voltage Vs Junction Temperature

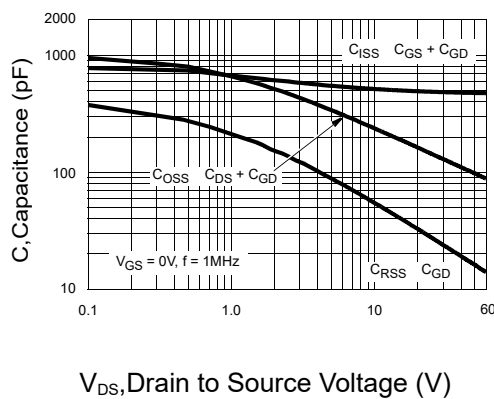


Figure 13: Capacitance vs Drain To Source Voltage

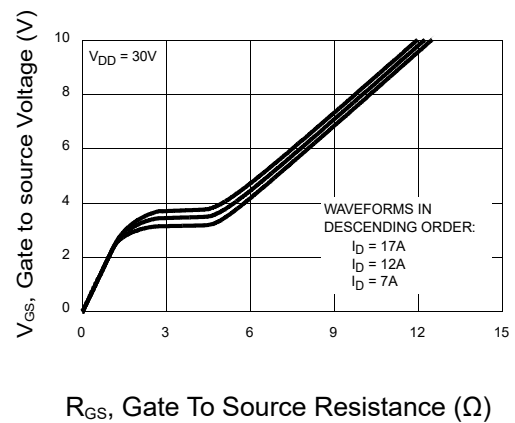


Figure 14: Gate Charge Waveforms For Constant Gate Current

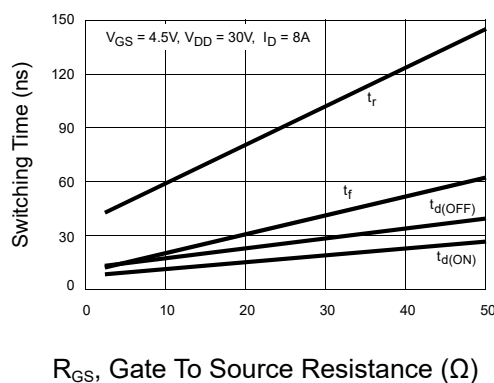


Figure 15: Switching Time vs Gate Resistance

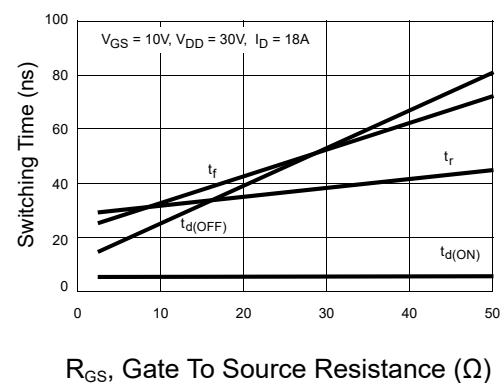


Figure 16: Switching Time vs Gate Resistance



7.4 Typical characteristic

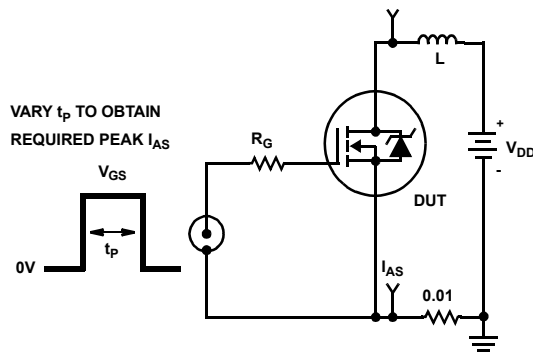


Figure 15. Unclamped Energy Test Circuit

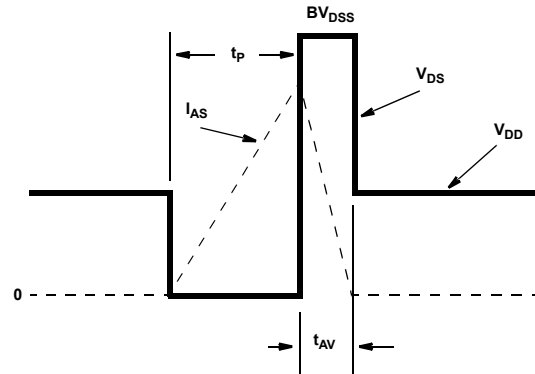


Figure 16. Unclamped Energy Waveforms

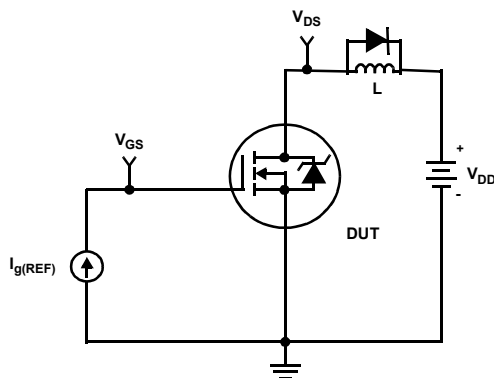


Figure 17. Gate Charge Test Circuit

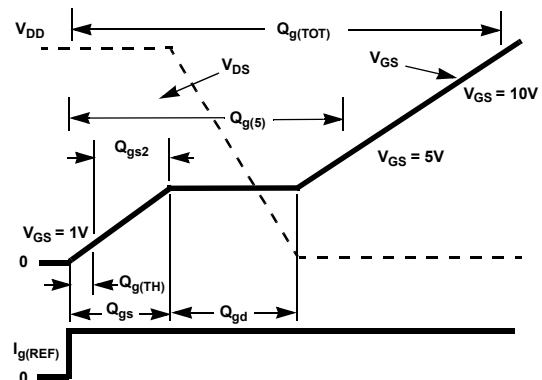


Figure 18. Gate Charge Waveforms

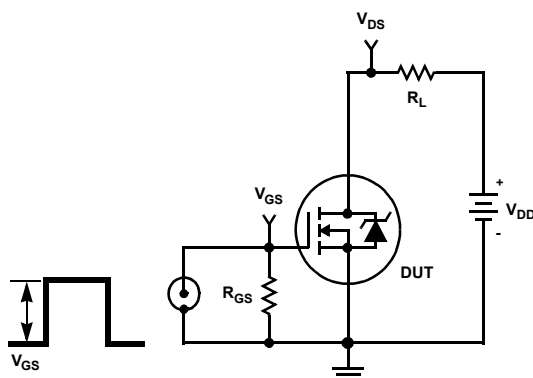


Figure 19. Switching Time Test Circuit

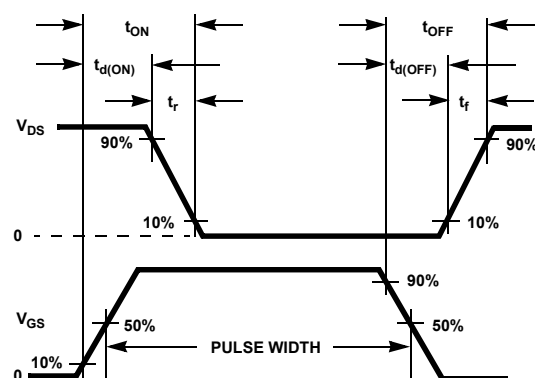
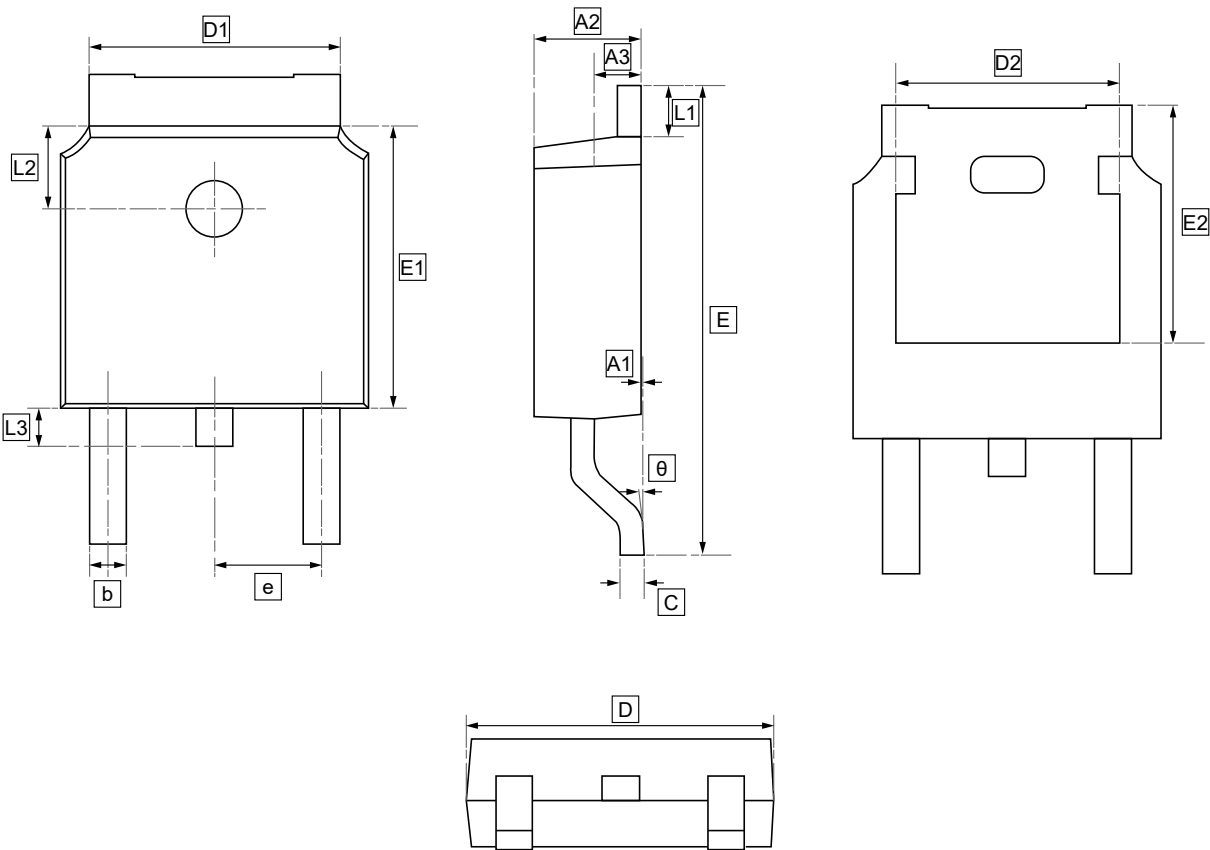


Figure 20. Switching Time Waveforms



8.TO-252 Package Outline Dimensions

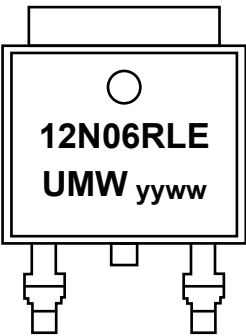


DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38		BSC	1.27	1.90	1.00



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW RFD12N06RLESM9A	TO-252	2500	Tape and reel



10.Disclaimer

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