

General Description

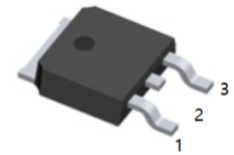
This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/DC converters using either synchronous or conventional switching PWM controllers. It has been optimized for low gate charge, low $r_{DS(ON)}$ and fast switching speed.

Features

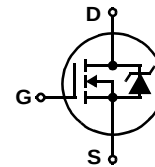
- High performance trench technology for extremely low $r_{DS(ON)}$
- Low gate charge
- High power and current handling capability
- RoHS Compliant

Applications

- DC/DC converters
- $V_{DS}(V) = 30V$
- $I_D = 35A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 5.1m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 6.4m\Omega$ ($V_{GS} = 4.5V$)



1.G 2.D 3.S
TO-252(DPAK) top view



MOSFET Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	± 20	V
I_D	Drain Current		
	Continuous ($T_C = 25^\circ C$, $V_{GS} = 10V$) (Note 1)	116	A
	Continuous ($T_C = 25^\circ C$, $V_{GS} = 4.5V$) (Note 1)	103	A
	Continuous ($T_{amb} = 25^\circ C$, $V_{GS} = 10V$, with $R_{\theta JA} = 52^\circ C/W$)	18	A
	Pulsed	Figure 4	A
E_{AS}	Single Pulse Avalanche Energy (Note 2)	240	mJ
P_D	Power dissipation	110	W
	Derate above $25^\circ C$	0.73	W/ $^\circ C$
T_J, T_{STG}	Operating and Storage Temperature	-55 to 175	$^\circ C$

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-252, TO-251	1.36	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, TO-251	100	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in ² copper pad area	52	$^\circ C/W$

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
B_{VDSS}	Drain to Source Breakdown Voltage	$I_D = 250\mu\text{A}$, $V_{GS} = 0\text{V}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 24\text{V}$ $V_{GS} = 0\text{V}$ $T_C = 150^\circ\text{C}$			1 250	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS} = \pm 20\text{V}$			± 100	nA
$V_{GS(TH)}$	Gate to Source Threshold Voltage	$V_{GS} = V_{DS}$, $I_D = 250\mu\text{A}$	1.2		2.5	V
$r_{DS(ON)}$	Drain to Source On Resistance	$I_D = 35\text{A}$, $V_{GS} = 10\text{V}$ $I_D = 35\text{A}$, $V_{GS} = 4.5\text{V}$		4.2 5.2	5.1 6.4	$\text{m}\Omega$
C_{ISS}	Input Capacitance	$V_{DS} = 15\text{V}$, $V_{GS} = 0\text{V}$, $f = 1\text{MHz}$		2990		pF
C_{OSS}	Output Capacitance			585		pF
C_{RSS}	Reverse Transfer Capacitance			340		pF
R_G	Gate Resistance	$V_{GS} = 0.5\text{V}$, $f = 1\text{MHz}$		2.0		Ω
$Q_{g(TOT)}$	Total Gate Charge at 10V	$V_{GS} = 0\text{V}$ to 10V		54	72	nC
$Q_{g(5)}$	Total Gate Charge at 5V	$V_{GS} = 0\text{V}$ to 5V		29	38	nC
$Q_{g(TH)}$	Threshold Gate Charge	$V_{GS} = 0\text{V}$ to 1V		3.0	4.0	nC
Q_{gs}	Gate to Source Gate Charge	$V_{DD} = 15\text{V}$ $I_D = 35\text{A}$ $I_g = 1.0\text{mA}$		8.0		nC
Q_{gs2}	Gate Charge Threshold to Plateau			5.0		nC
Q_{gd}	Gate to Drain "Miller" Charge			10		nC
t_{ON}	Turn-On Time				156	ns
$t_{d(ON)}$	Turn-On Delay Time	$V_{DD} = 15\text{V}$, $I_D = 35\text{A}$ $V_{GS} = 10\text{V}$, $R_{GS} = 4.7\Omega$		9		ns
t_r	Rise Time			96		ns
$t_{d(OFF)}$	Turn-Off Delay Time			47		ns
t_f	Fall Time			37		ns
t_{OFF}	Turn-Off Time				126	ns
V_{SD}	Source to Drain Diode Voltage	$I_{SD} = 35\text{A}$			1.25	V
		$I_{SD} = 15\text{A}$			1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 35\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$			32	ns
Q_{RR}	Reverse Recovered Charge	$I_{SD} = 35\text{A}$, $dI_{SD}/dt = 100\text{A}/\mu\text{s}$			18	nC

Notes:

- Package current limitation is 35A.
- Starting $T_J = 25^\circ\text{C}$, $L = 0.61\text{mH}$, $I_{AS} = 28\text{A}$, $V_{DD} = 27\text{V}$, $V_{GS} = 10\text{V}$.

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

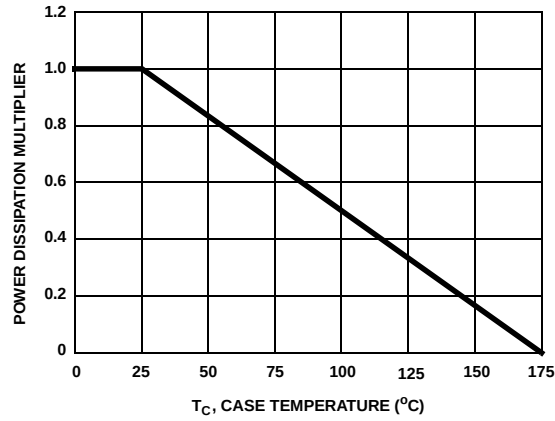


Figure 1. Normalized Power Dissipation vs Case Temperature

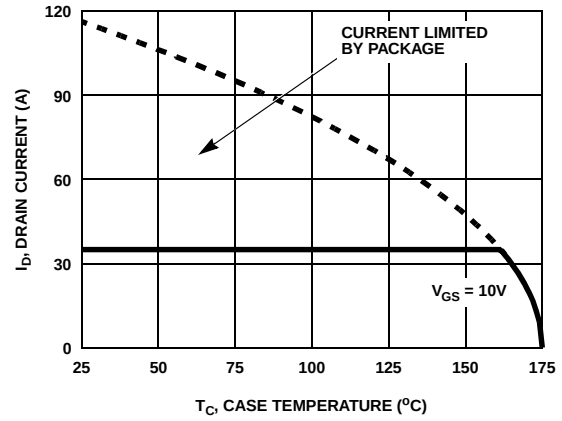


Figure 2. Maximum Continuous Drain Current vs Case Temperature

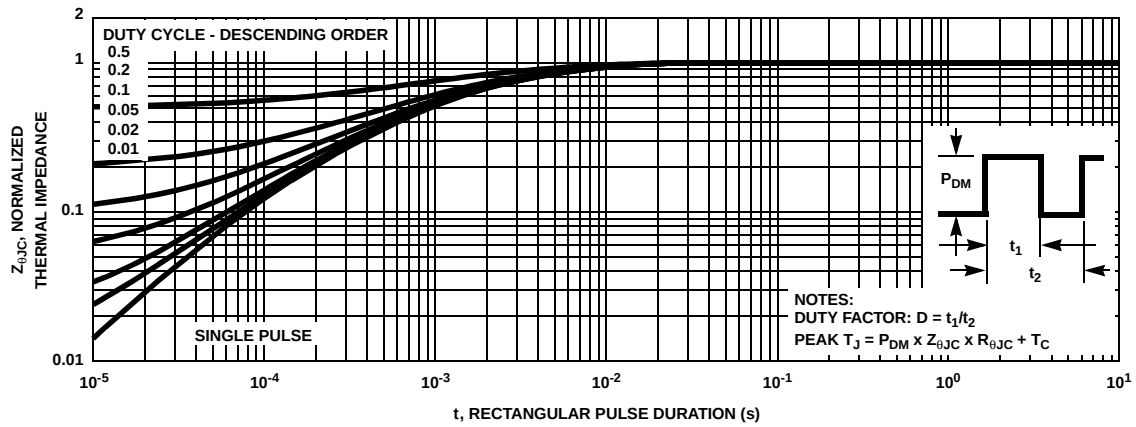


Figure 3. Normalized Maximum Transient Thermal Impedance

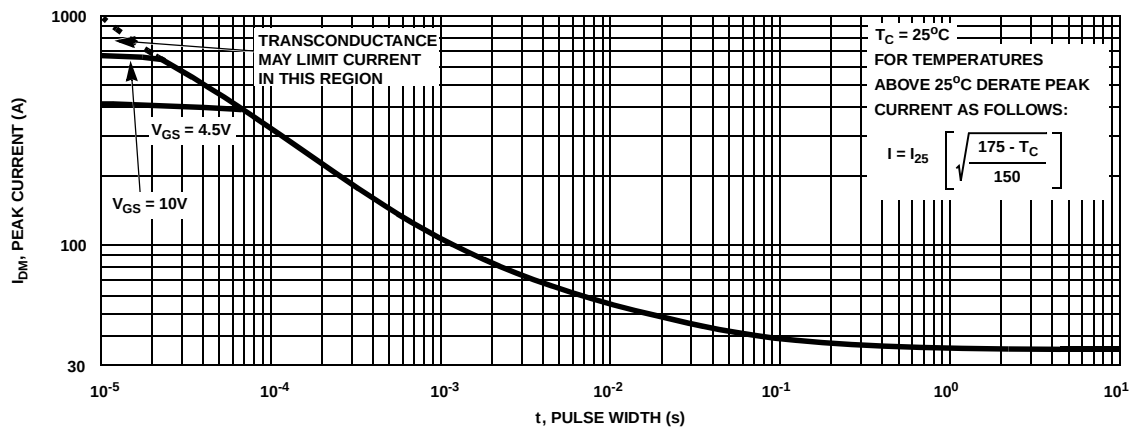


Figure 4. Peak Current Capability

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

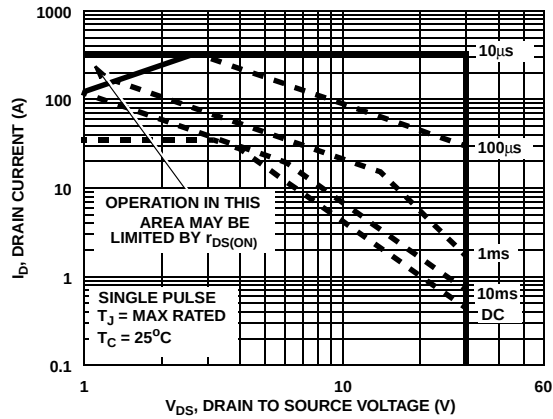


Figure 5. Forward Bias Safe Operating Area

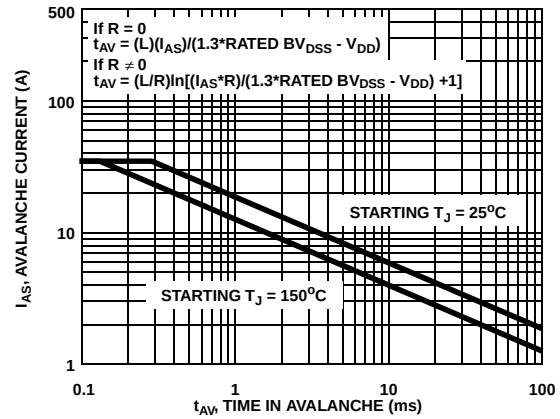


Figure 6. Unclamped Inductive Switching Capability

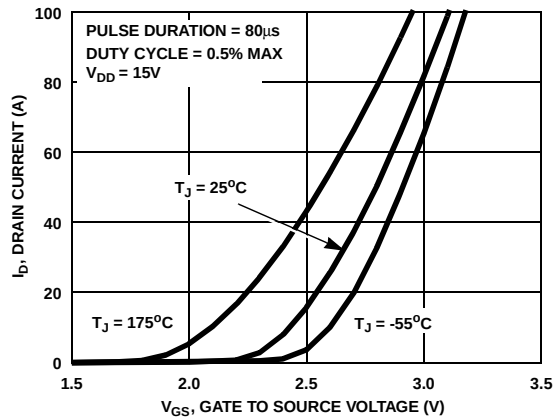


Figure 7. Transfer Characteristics

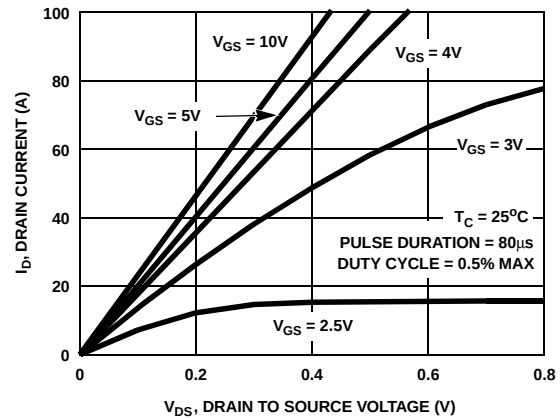


Figure 8. Saturation Characteristics

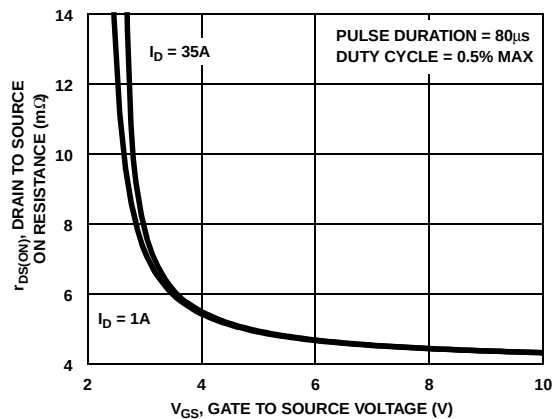


Figure 9. Drain to Source On Resistance vs Gate Voltage and Drain Current

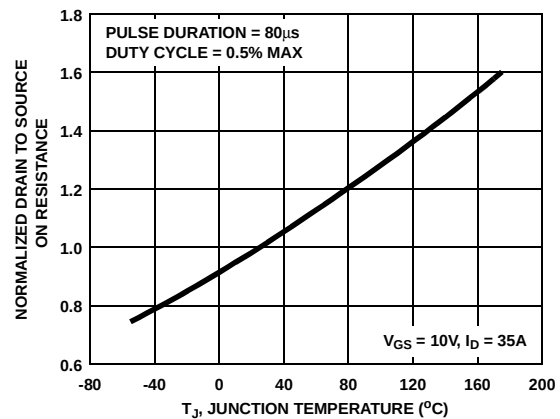


Figure 10. Normalized Drain to Source On Resistance vs Junction Temperature

Typical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

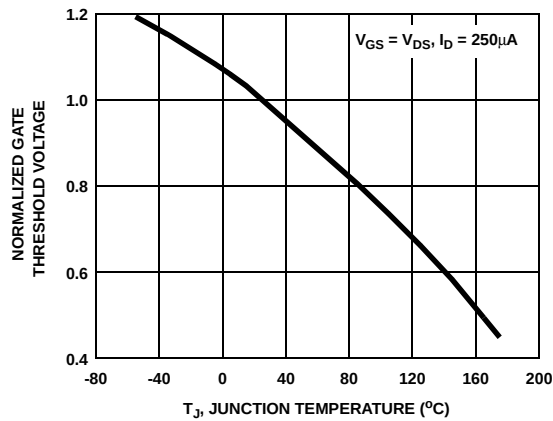


Figure 11. Normalized Gate Threshold Voltage vs Junction Temperature

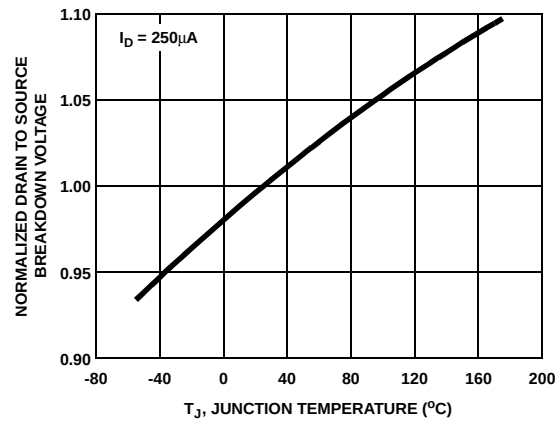


Figure 12. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

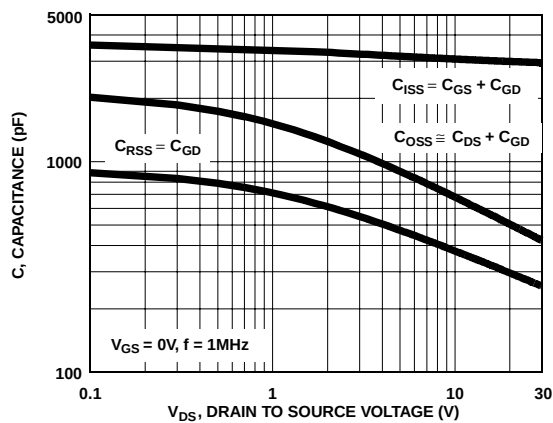


Figure 13. Capacitance vs Drain to Source Voltage

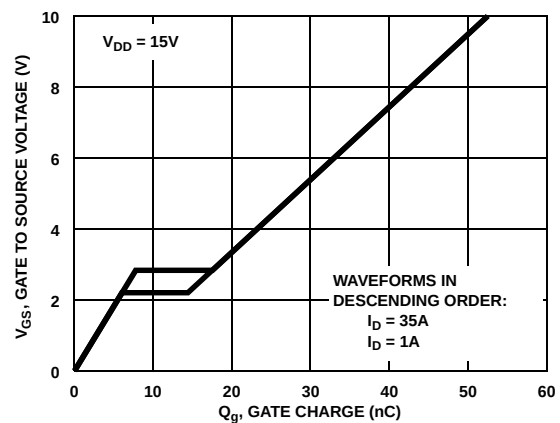


Figure 14. Gate Charge Waveforms for Constant Gate Current

Test Circuits and Waveforms

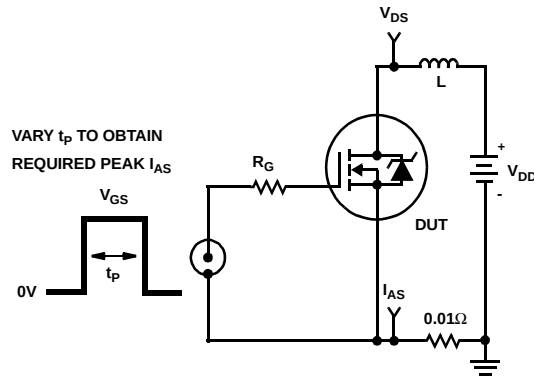


Figure 15. Unclamped Energy Test Circuit

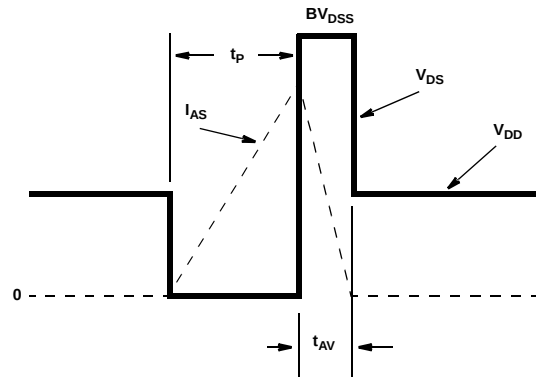


Figure 16. Unclamped Energy Waveforms

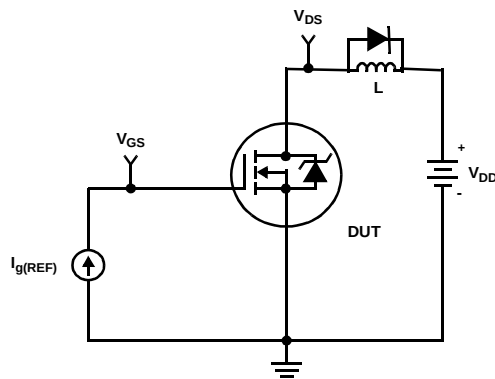


Figure 17. Gate Charge Test Circuit

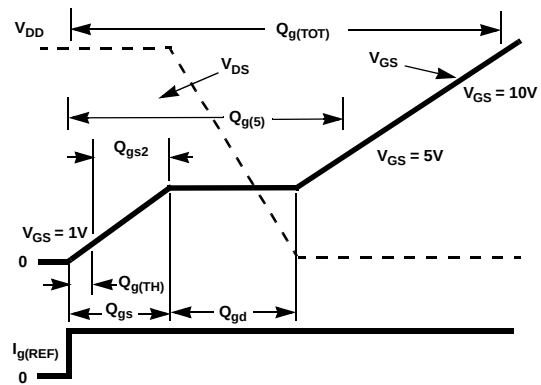


Figure 18. Gate Charge Waveforms

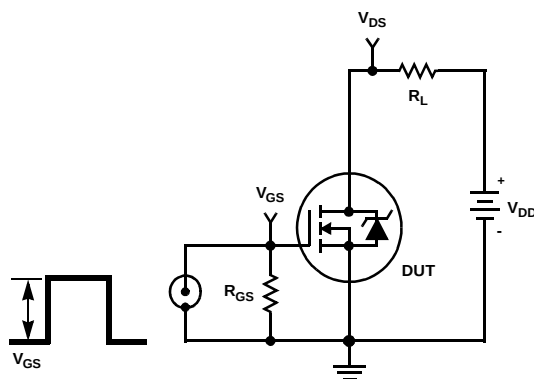


Figure 19. Switching Time Test Circuit

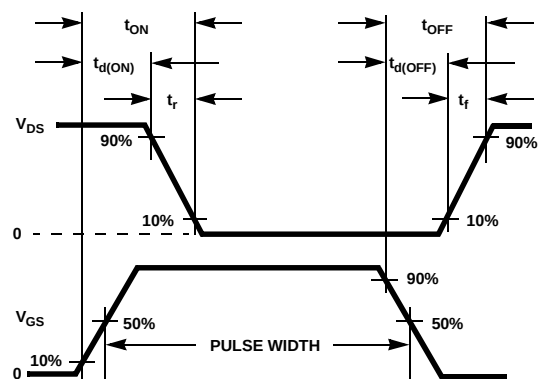
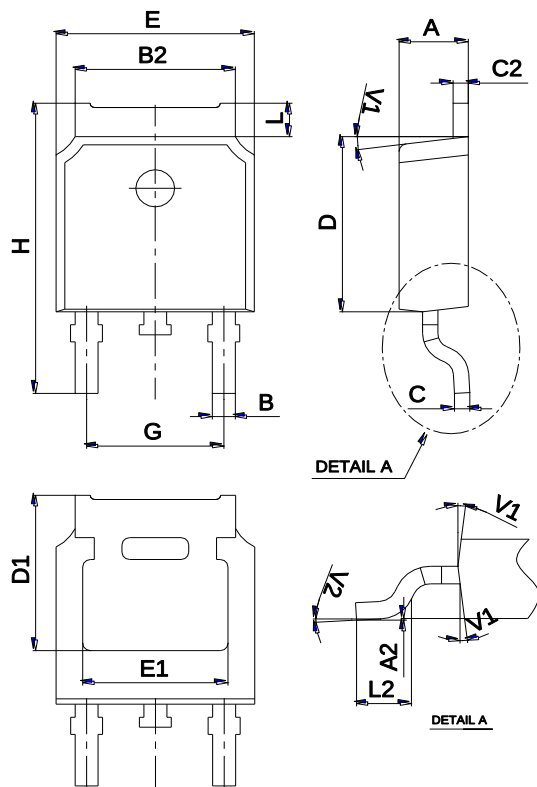


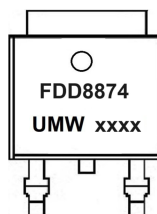
Figure 20. Switching Time Waveforms

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDD8874	TO-252	2500	Tape and reel