

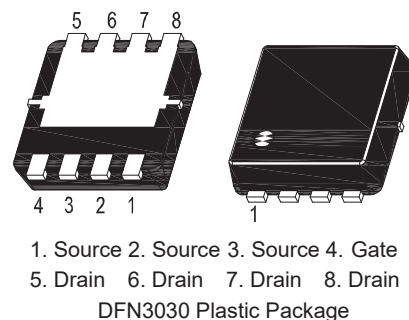
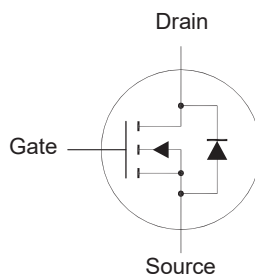
N-Channel Enhancement Mode MOSFET

Features

- Low $R_{DS(ON)}$
- Surface-mounted package
- Low Gate-Source Threshold Voltage
- Halogen and Antimony Free(HAF), RoHS compliant

Applications

- Load switch



Key Parameters

Parameter	Value	Unit
BV_{DSS}	30	V
$R_{DS(ON)}$ Max	8.3 @ $V_{GS} = 10\text{ V}$	$m\Omega$
	12 @ $V_{GS} = 4.5\text{ V}$	
$V_{GS(th)}$ typ	1	V
Q_g typ	21.6 @ $V_{GS} = 10\text{ V}$	nC

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	40	A
		25	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	160	A
Avalanche Current	I_{AS}	25.2	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	31.7	mJ
Total Power Dissipation	P_{tot}	19.2	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	6.5	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	65	$^\circ\text{C/W}$

¹⁾ Pulse Test: Pulse Width $\leq 100\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.1\text{ mH}$, $R_g = 25\text{ }\Omega$, $I_{AS} = 25.2\text{ A}$, $V_{GS} = 10\text{ V}$.

³⁾ Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.

Characteristics at T_a = 25°C unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I _D = 5 mA	BV _{DSS}	30	-	-	V
Drain-Source Leakage Current at V _{DS} = 24 V	I _{DSS}	-	-	1	μA
Gate Leakage Current at V _{GS} = ± 16 V	I _{GSS}	-	-	± 100	nA
Gate-Source Threshold Voltage at V _{DS} = V _{GS} , I _D = 250 μA	V _{GS(th)}	1	-	2	V
Drain-Source On-State Resistance at V _{GS} = 10 V, I _D = 10 A at V _{GS} = 4.5 V, I _D = 8 A	R _{DS(on)}	- -	6.2 -	8.3 12	mΩ
DYNAMIC PARAMETERS					
Forward Transconductance at V _{DS} = 5 V, I _D = 10 A	g _{fs}	-	16.7	-	S
Gate resistance at V _{GS} = 0 V, V _{DS} = 0 V, f = 1 MHz	R _g	-	1.9	-	Ω
Input Capacitance at V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz	C _{iss}	-	960	-	pF
Output Capacitance at V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz	C _{oss}	-	149	-	pF
Reverse Transfer Capacitance at V _{GS} = 0 V, V _{DS} = 15 V, f = 1 MHz	C _{rss}	-	108	-	pF
Gate charge total at V _{DS} = 15 V, I _D = 10 A, V _{GS} = 10 V at V _{DS} = 15 V, I _D = 10 A, V _{GS} = 4.5 V	Q _g	- -	21.6 10.6	- -	nC
Gate to Source Charge at V _{DS} = 15 V, I _D = 10 A, V _{GS} = 10 V	Q _{gs}	-	2.6	-	nC
Gate to Drain Charge at V _{DS} = 15 V, I _D = 10 A, V _{GS} = 10 V	Q _{gd}	-	4.6	-	nC
Turn-On Delay Time at V _{DD} = 15 V, I _D = 10 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _{d(on)}	-	10	-	ns
Turn-On Rise Time at V _{DD} = 15 V, I _D = 10 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _r	-	8	-	ns
Turn-Off Delay Time at V _{DD} = 15 V, I _D = 10 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _{d(off)}	-	12	-	ns
Turn-Off Fall Time at V _{DD} = 15 V, I _D = 10 A, V _{GS} = 10 V, R _g = 3.3 Ω	t _f	-	2	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I _S = 1 A, V _{GS} = 0 V	V _{SD}	-	-	1.2	V
Body-Diode Continuous Current	I _S	-	-	40	A
Body-Diode Continuous Current, Pulsed	I _{SM}	-	-	160	A
Body Diode Reverse Recovery Time at I _S = 10 A, di/dt = 100 A / μs	t _{rr}	-	11	-	ns
Body Diode Reverse Recovery Charge at I _S = 10 A, di/dt = 100 A / μs	Q _{rr}	-	2	-	nC

Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

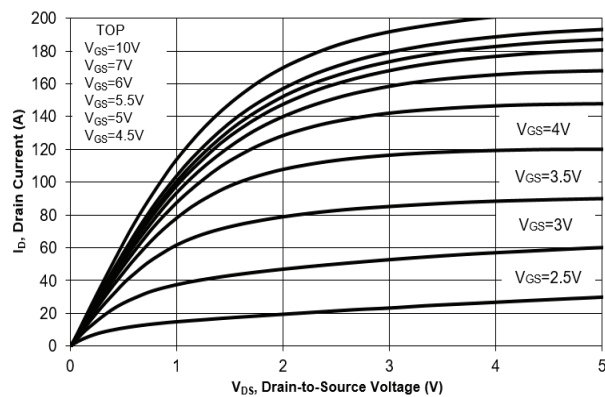


Fig. 2 Typical Transfer Characteristics

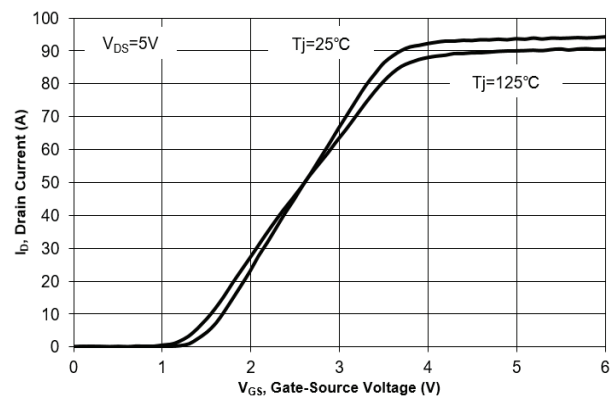


Fig. 3 On-Resistance vs. Drain Current

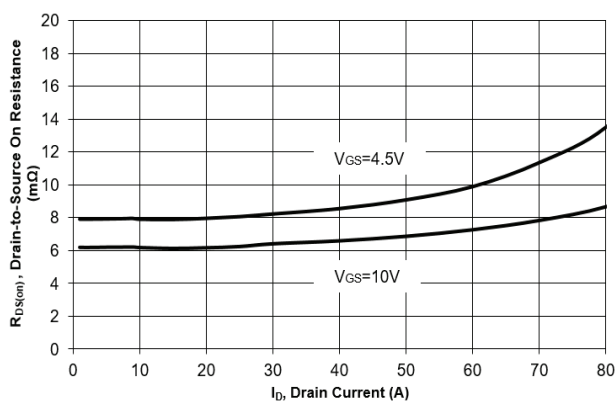


Fig. 4 On-Resistance vs. Gate to Source Voltage

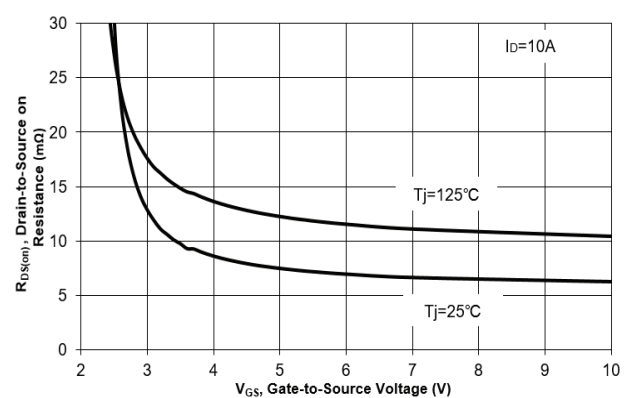


Fig. 5 On-Resistance vs. T_J

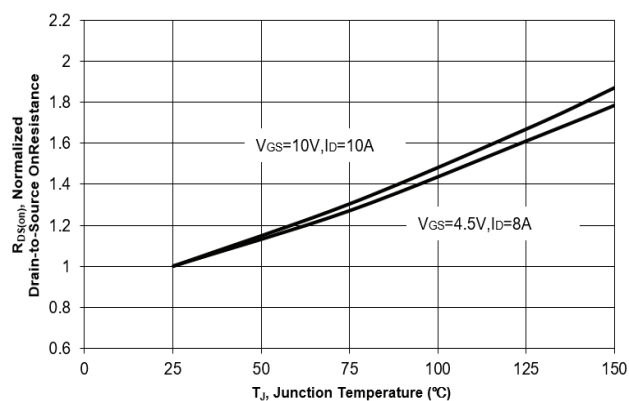
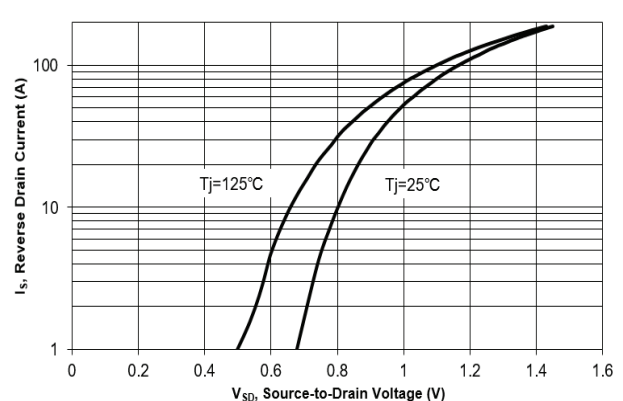


Fig. 6 Typical Body Diode Forward Characteristics



Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

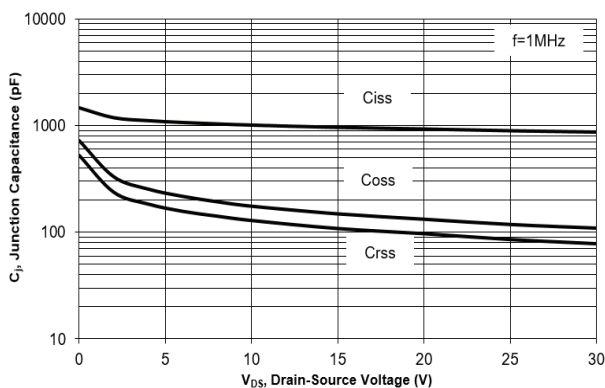


Fig. 8 Drain-Source Leakage Current vs. T_j

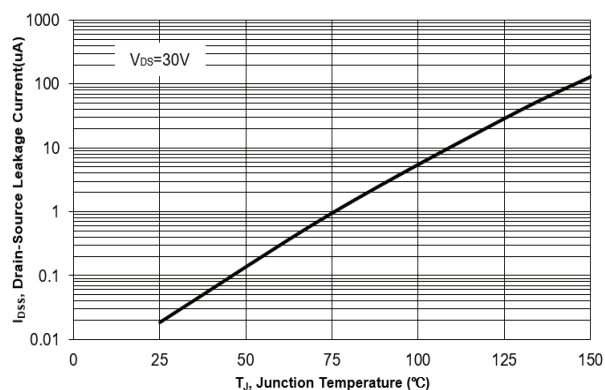


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

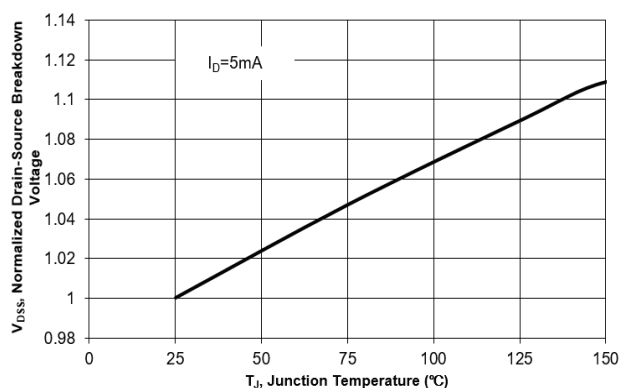


Fig. 10 Gate Threshold Variation vs. T_j

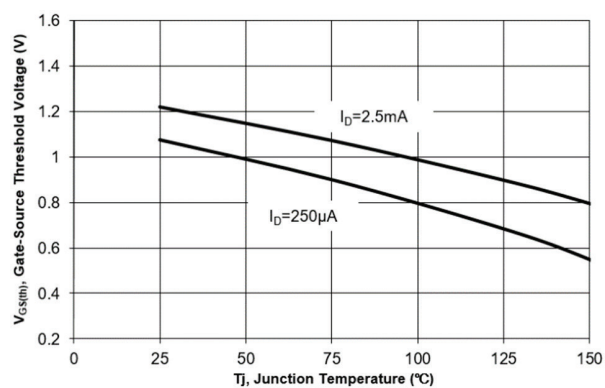


Fig. 11 Gate Charge

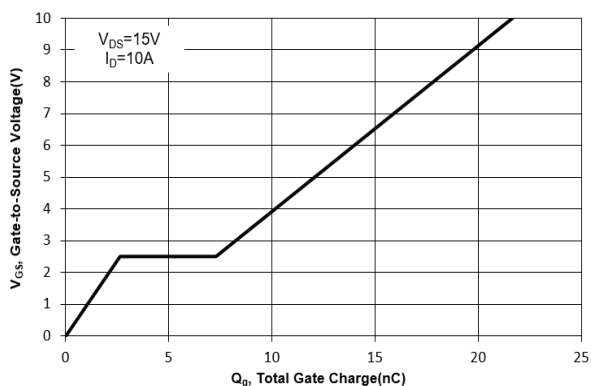
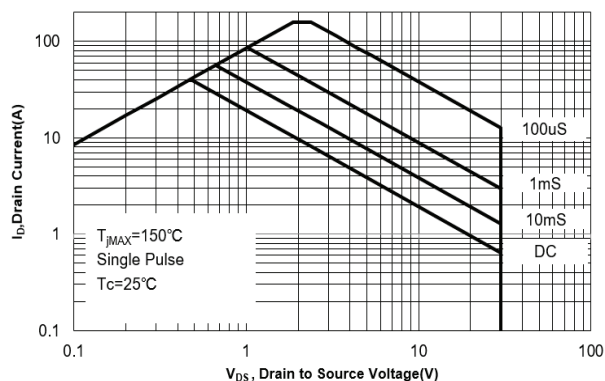


Fig. 12 Safe Operation Area



Electrical Characteristics Curves

Fig. 13 Normalized Maximum Transient Thermal Impedance($Z_{\theta JC}$)

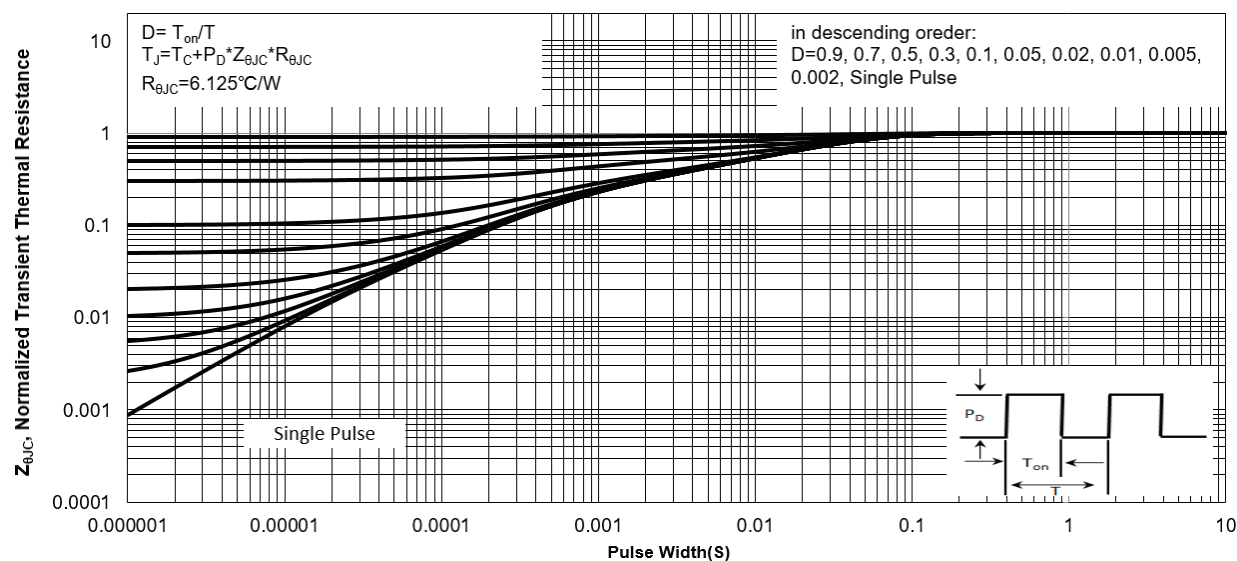
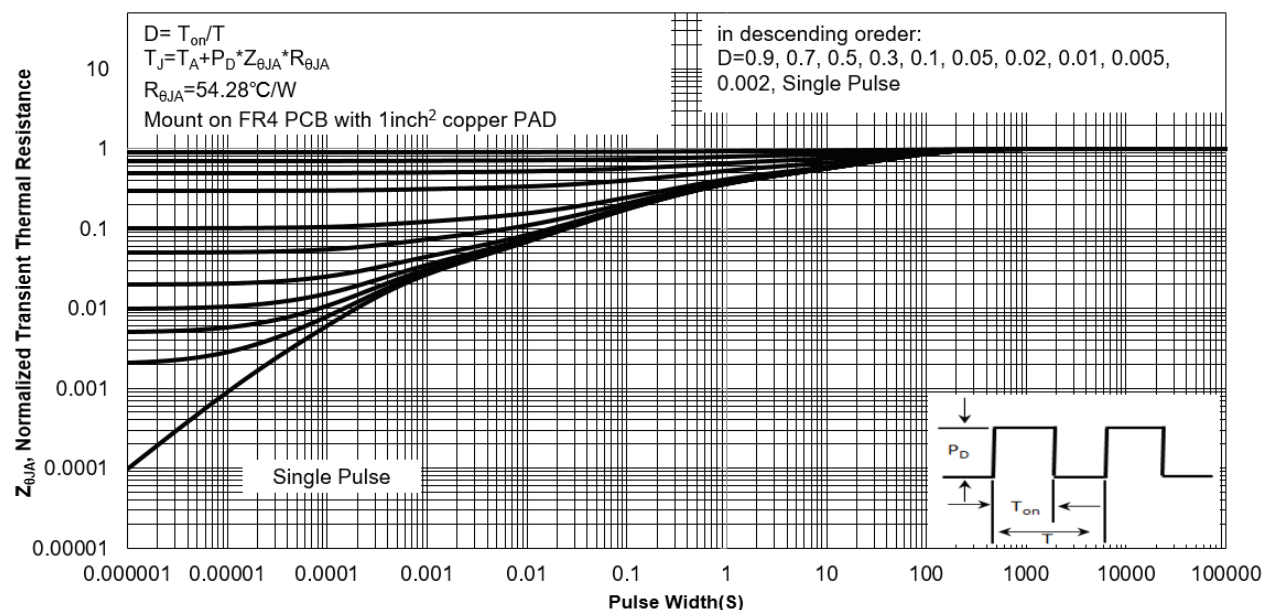


Fig. 14 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



Test Circuits

Fig.1-1 Switching times test circuit

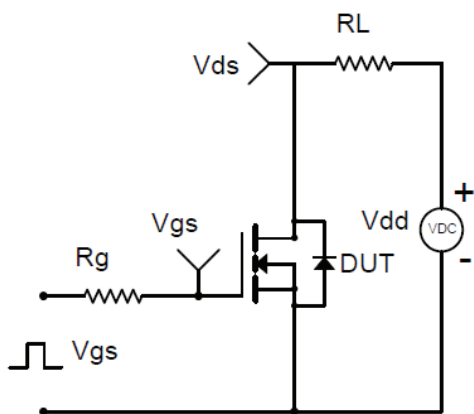


Fig.1-2 Switching Waveform

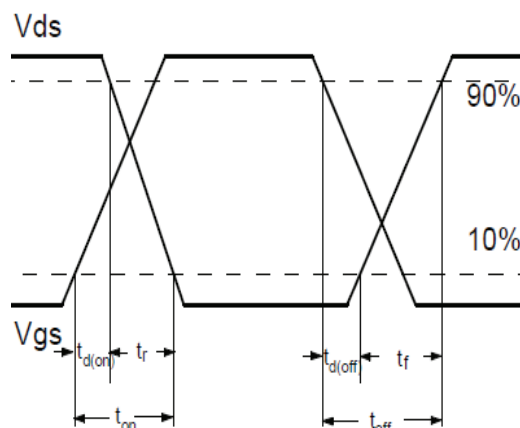


Fig.2-1 Gate charge test circuit

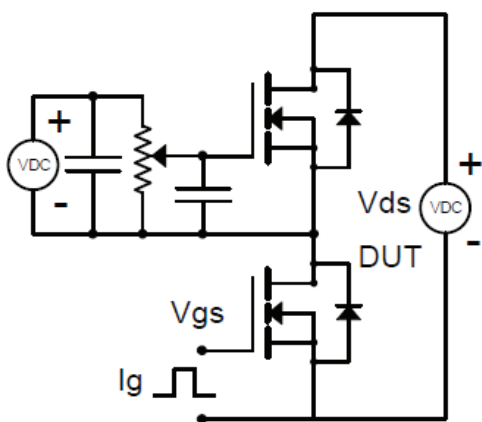


Fig.2-2 Gate charge waveform

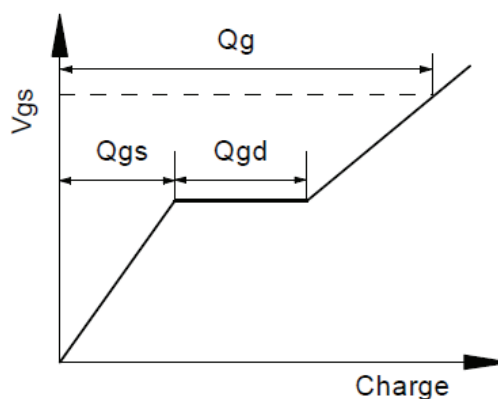


Fig.3-1 Avalanche test circuit

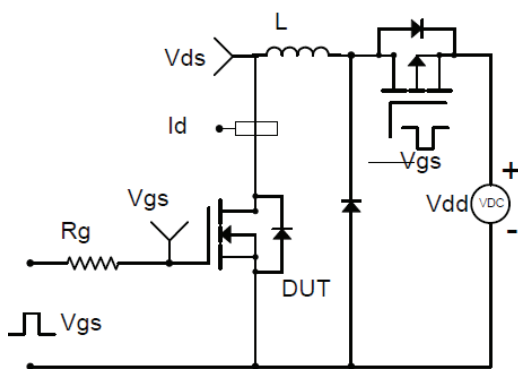
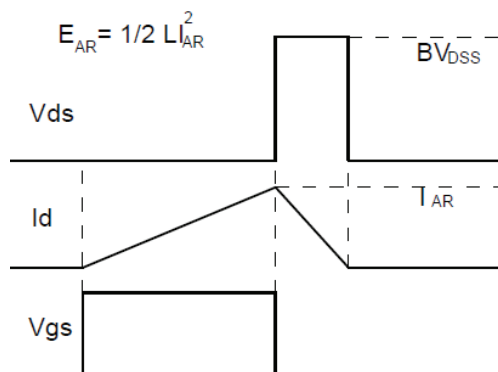
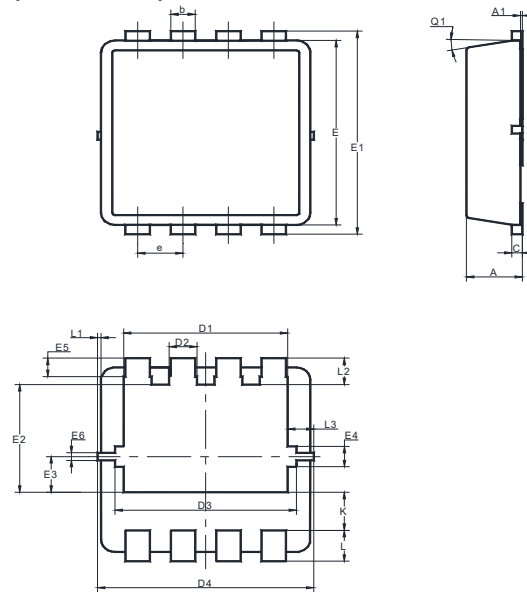


Fig.3-2 Avalanche waveform



Package Outline Dimensions (Units: mm)

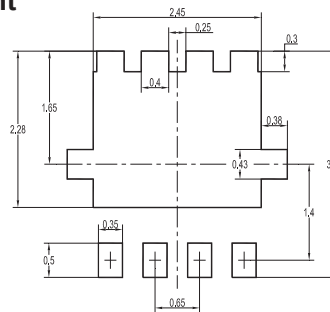
DFN3030



UNIT	A	A1	b	c	D1	D2	D3	D4	E	E1	E2	E3	E4
mm	0.9	0.05	0.35	0.25	2.6	0.5	2.7	3.2	3.1	3.3	1.85	0.68	0.43
	0.7	0	0.24	0.1	2.4	0.3	2.5	3	2.9	3.1	1.65	0.48	0.23

UNIT	E5	E6	e	K	L	L1	L2	L3	θ1
mm	0.4	0.25	0.7	0.72	0.5	0.1	0.53	0.475	12°
	0.2	0.15	0.6	0.52	0.3	0	0.33	0.275	0°

Recommended Soldering Footprint



Packing information

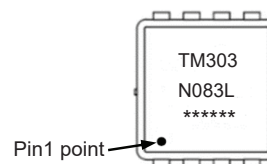
Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
DFN3030	12	8 ± 0.1	0.315 ± 0.004	330	13	5,000

Marking information

" TM303N083L " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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