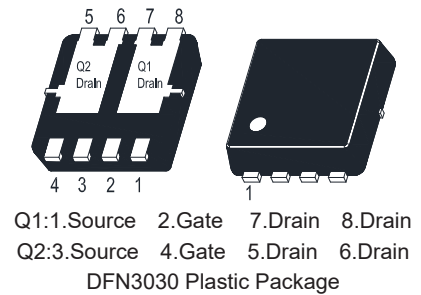
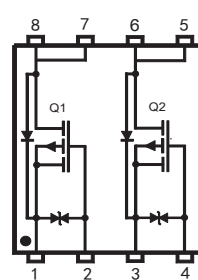


Dual P-Channel Enhancement Mode MOSFET

Features

- Surface-mounted package
- Built-in G-S Protection Diode
- Halogen and Antimony Free(HAF), RoHS compliant
- Typical ESD Protection HBM Class 1B

Classification	Voltage Range(V)
0A	< 125
0B	125 to < 250
1A	250 to < 500
1B	500 to < 1000
1C	1000 to < 2000
2	2000 to < 4000
3A	4000 to < 8000
3B	≥ 8000



Key Parameters (Q1/Q2)

Parameter	Value	Unit
$-BV_{DSS}$	30	V
$R_{DS(ON)}$ Max	39 @ $-V_{GS} = 10$ V	mΩ
	60 @ $-V_{GS} = 4.5$ V	
$-V_{GS(th)}$ typ	1.7	V
Q_g typ	15.5 @ $-V_{GS} = 4.5$ V	nC

Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified) (Q1/Q2)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	$-I_D$	15	A
		9.4	
Peak Drain Current, Pulsed ¹⁾	$-I_{DM}$	60	A
Avalanche Current	$-I_{AS}$	16.8	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	14	mJ
Total Power Dissipation	P_{tot}	12.5	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to + 150	°C

Thermal Characteristics(Q1/Q2)

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	10	°C/W
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	90	°C/W

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

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.1$ mH, $R_g = 25$ Ω, $-I_{AS} = 16.8$ A, $V_{GS} = 10$ V.

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

Characteristics at $T_a = 25^\circ\text{C}$ unless otherwise specified (Q1/Q2)

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at $-I_D = 250\ \mu\text{A}$	$-BV_{DS}$	30	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 24\ \text{V}$	$-I_{DSS}$	-	-	1	μA
Gate Source Leakage Current at $V_{GS} = \pm 20\ \text{V}$	I_{GSS}	-	-	± 10	μA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$, $-I_D = 250\ \mu\text{A}$	$-V_{GS(th)}$	1.2	-	2.5	V
Drain-Source On-State Resistance at $-V_{GS} = 10\ \text{V}$, $-I_D = 5\ \text{A}$ at $-V_{GS} = 4.5\ \text{V}$, $-I_D = 2.5\ \text{A}$	$R_{DS(on)}$	- -	30 -	39 60	$\text{m}\Omega$
DYNAMIC PARAMETERS					
Forward Transconductance at $-V_{DS} = 5\ \text{V}$, $-I_D = 5\ \text{A}$	g_{fs}	-	8	-	S
Gate resistance at $V_{DS} = 0\ \text{V}$, $V_{GS} = 0\ \text{V}$, $f = 1\ \text{MHz}$	R_g	-	38	-	Ω
Input Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{iss}	-	942	-	pF
Output Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{oss}	-	95	-	pF
Reverse Transfer Capacitance at $V_{GS} = 0\ \text{V}$, $-V_{DS} = 15\ \text{V}$, $f = 1\ \text{MHz}$	C_{rss}	-	62	-	pF
Total Gate Charge at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$ at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 4.5\ \text{V}$	Q_g	- -	15.5 7.2	- -	nC
Gate to Source Charge at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$	Q_{gs}	-	3.8	-	nC
Gate to Drain Charge at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$	Q_{gd}	-	2.3	-	nC
Turn-On Delay Time at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	$t_{d(on)}$	-	5	-	ns
Turn-On Rise Time at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	t_r	-	21	-	ns
Turn-Off Delay Time at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	$t_{d(off)}$	-	39	-	ns
Turn-Off Fall Time at $-V_{DS} = 15\ \text{V}$, $-I_D = 5\ \text{A}$, $-V_{GS} = 10\ \text{V}$, $R_g = 3.3\ \Omega$	t_f	-	11	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at $-I_S = 1\ \text{A}$, $V_{GS} = 0\ \text{V}$	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_S$	-	-	15	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	60	A
Body Diode Reverse Recovery Time at $-I_S = 5\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	t_{rr}	-	9	-	ns
Body Diode Reverse Recovery Charge at $-I_S = 5\ \text{A}$, $di/dt = 100\ \text{A} / \mu\text{s}$	Q_{rr}	-	5	-	nC

Electrical Characteristics Curves (Q1/Q2)

Fig. 1 Typical Output Characteristics

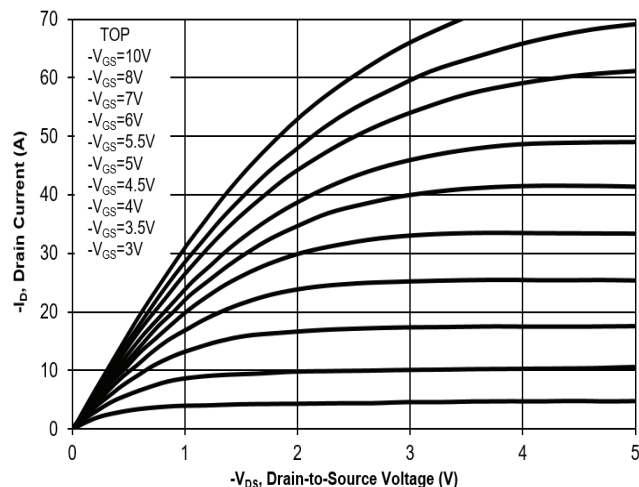


Fig. 2 Typical Transfer Characteristics

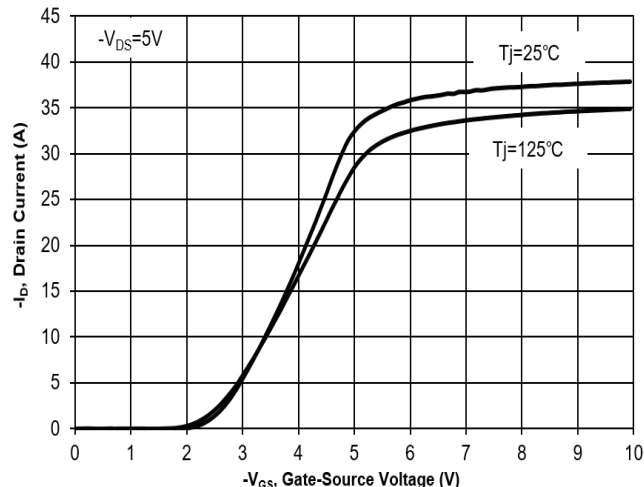


Fig. 3 On-Resistance vs. Drain Current

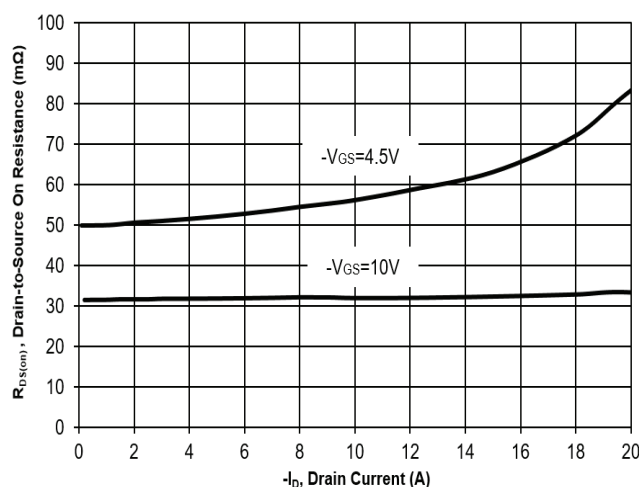


Fig. 4 On-Resistance vs. Gate to Source Voltage

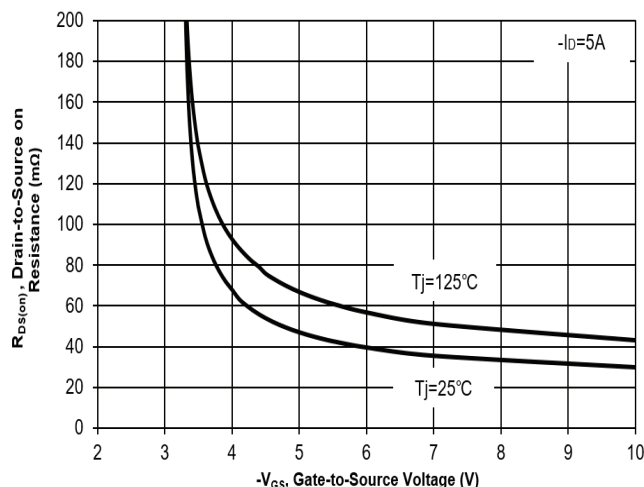


Fig. 5 On-Resistance vs. T_J

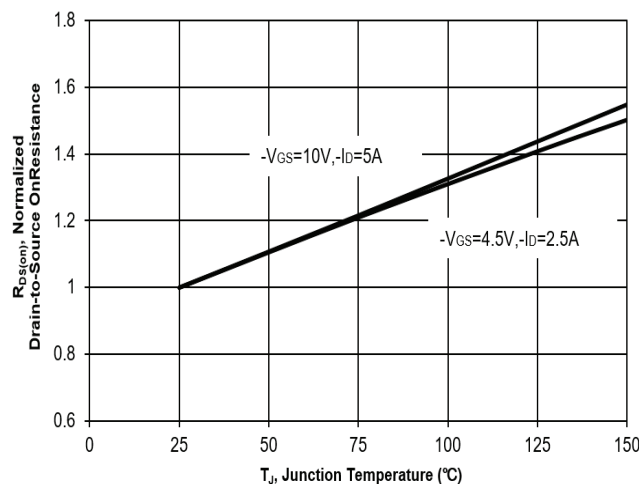
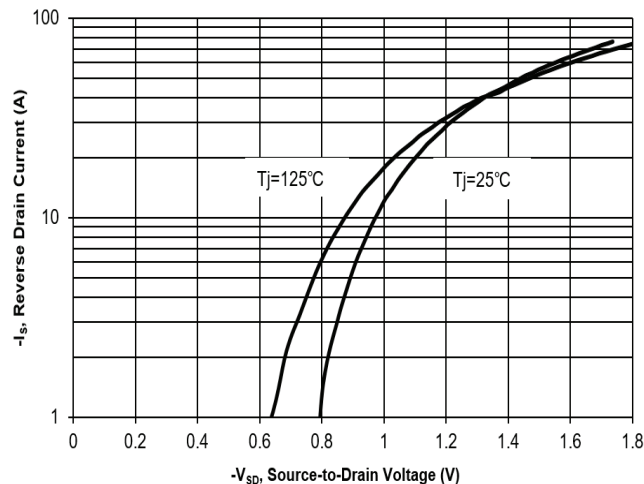


Fig. 6 Typical Body Diode Forward Characteristics



Electrical Characteristics Curves (Q1/Q2)

Fig. 7 Typical Junction Capacitance

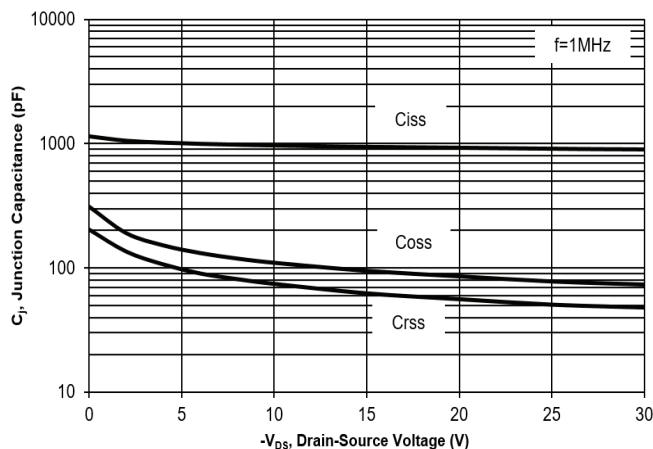


Fig. 8 Drain-Source Leakage Current vs. T_j

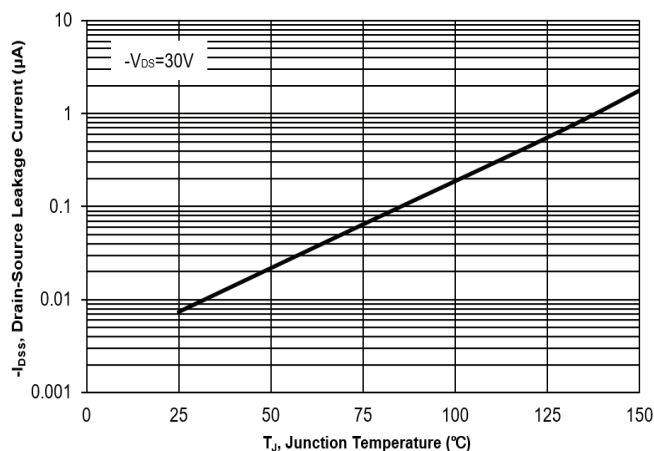


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

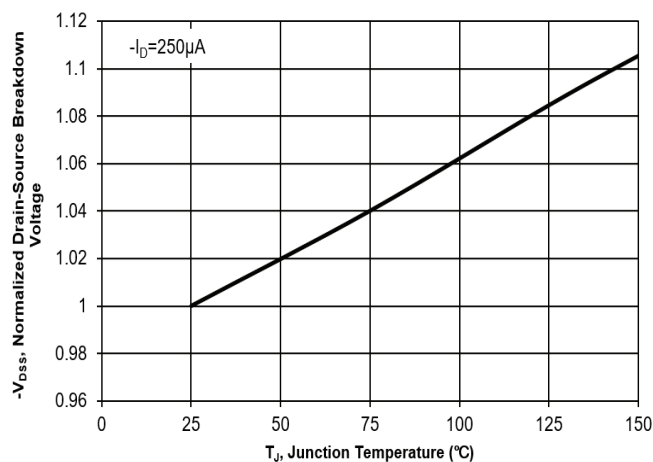


Fig. 10 Gate Threshold Variation vs. T_j

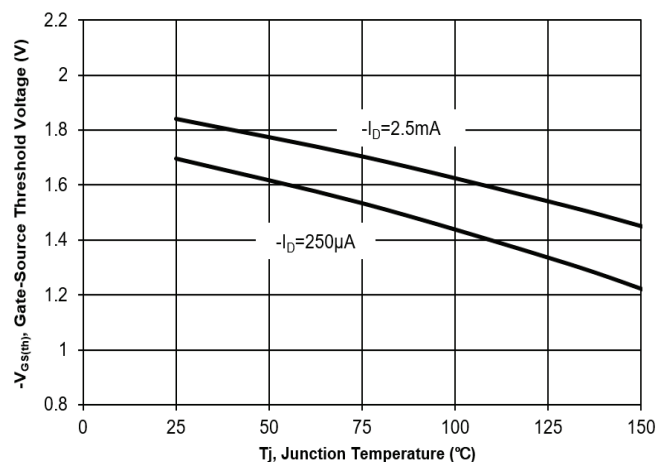


Fig. 11 Gate Charge

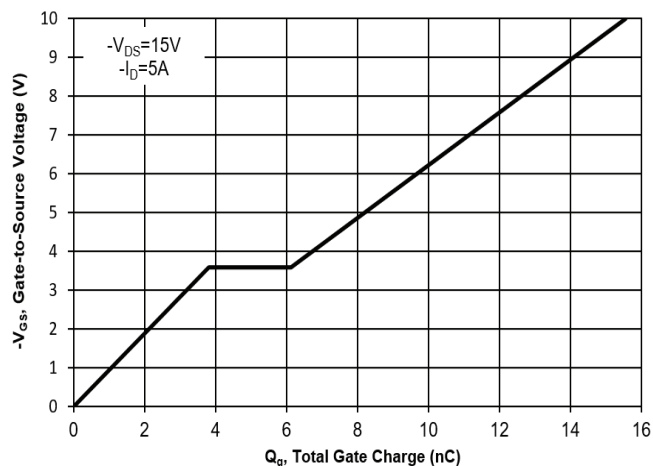
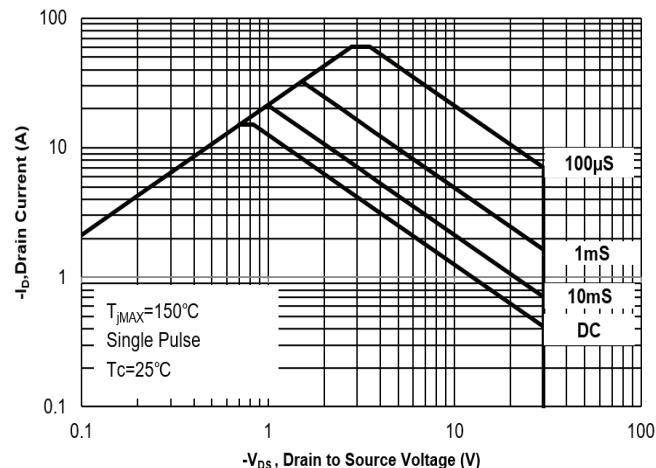


Fig. 12 Safe Operation Area



Electrical Characteristics Curves (Q1/Q2)

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

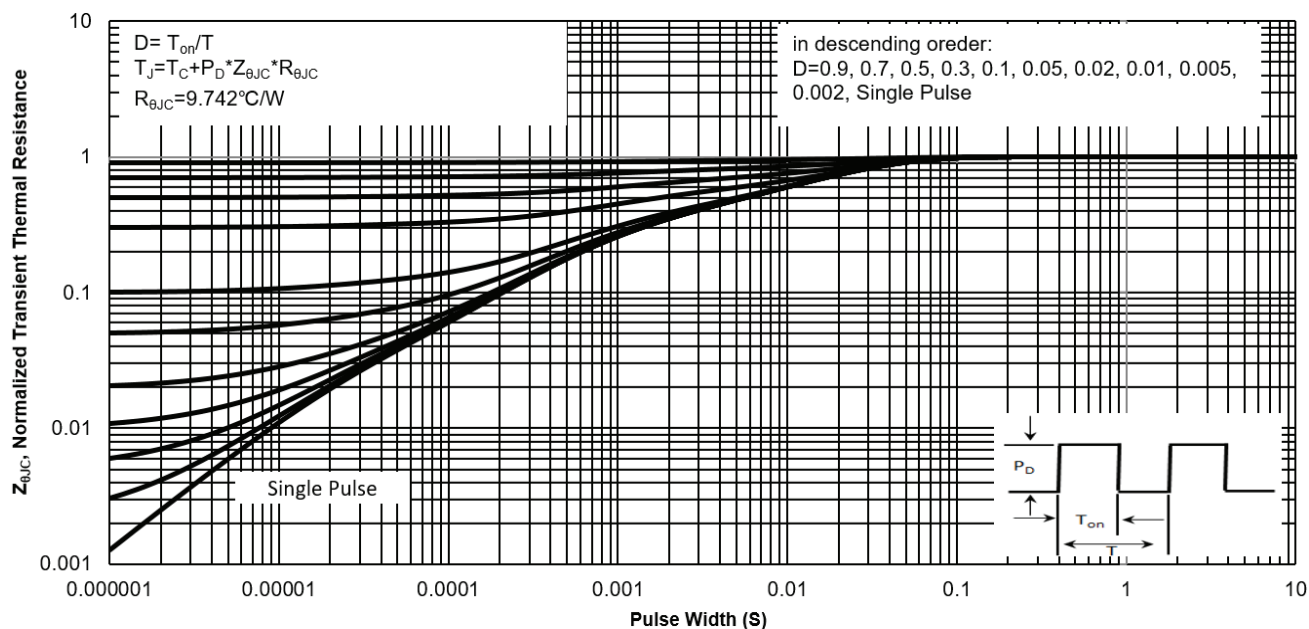
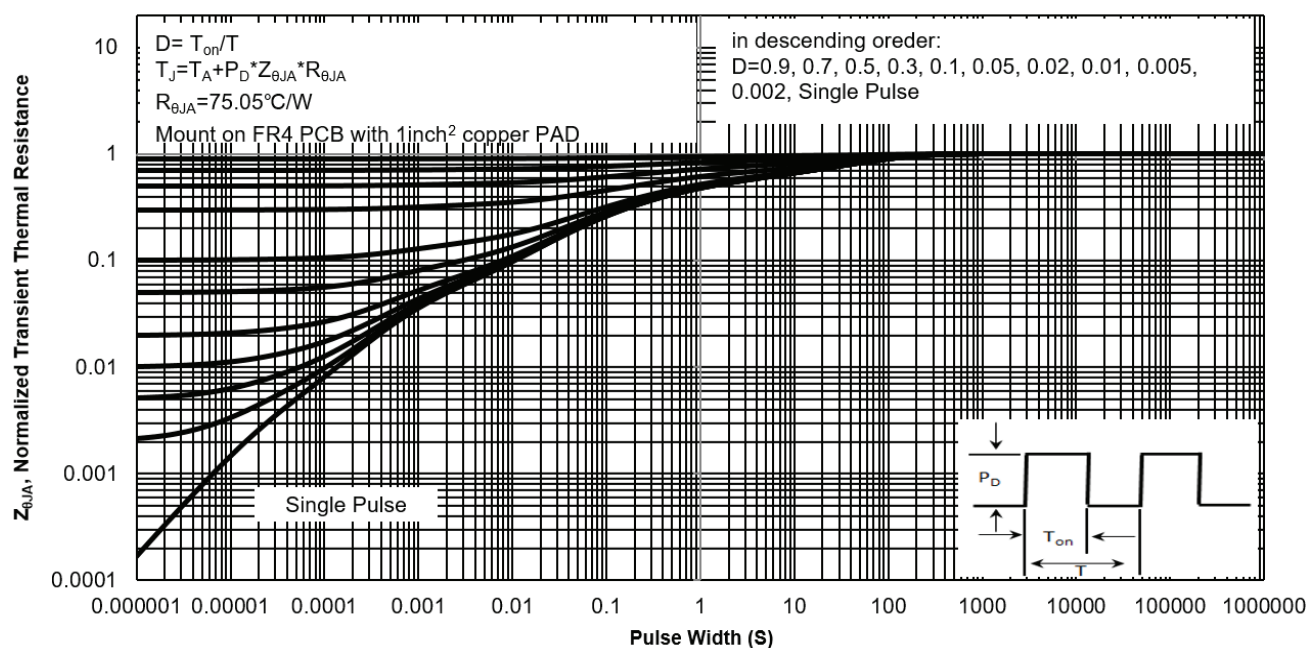


Fig. 14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)



Test Circuits(Q1/Q2)

Fig.1-1 Switching times test circuit

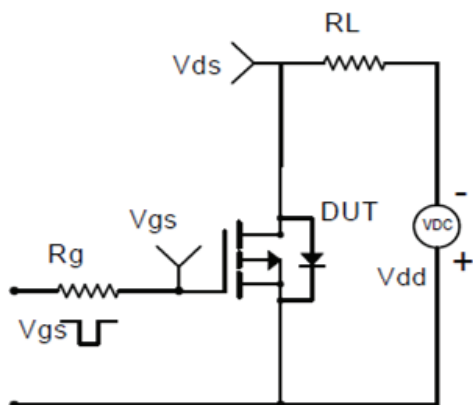


Fig.1-2 Switching Waveform

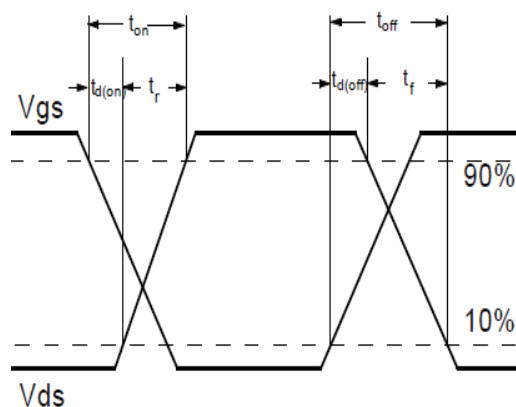


Fig.2-1 Gate charge test circuit

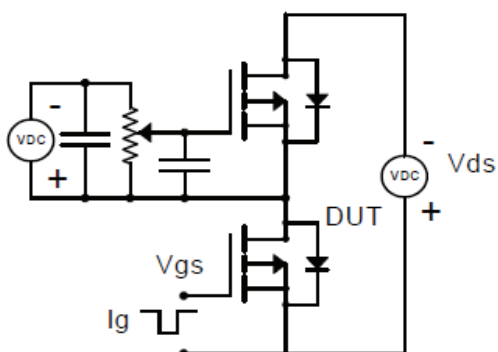


Fig.2-2 Gate charge waveform

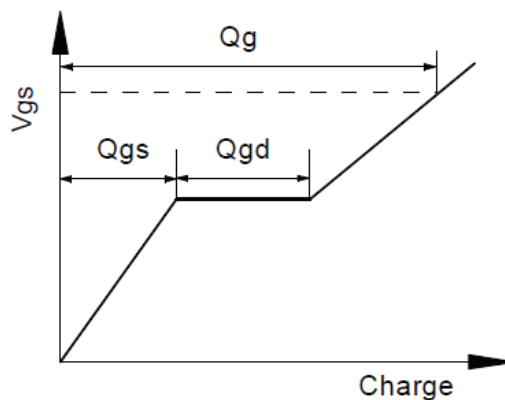


Fig.3-1 Avalanche test circuit

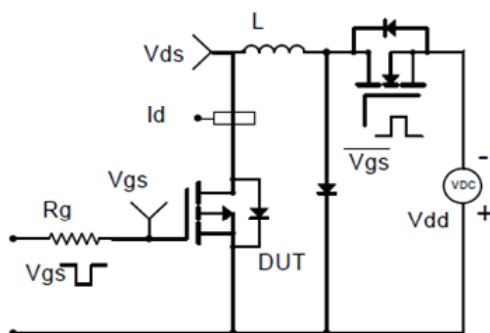
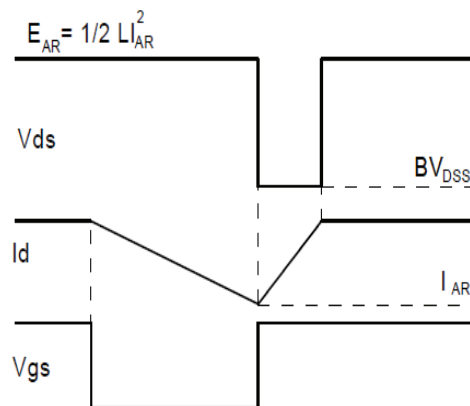
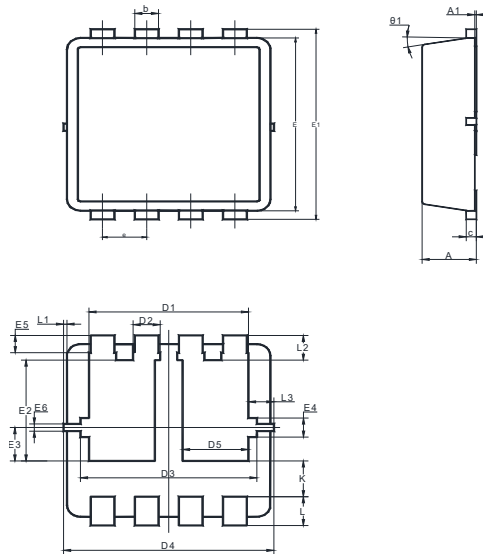


Fig.3-2 Avalanche waveform



Package Outline Dimensions (Units: mm)

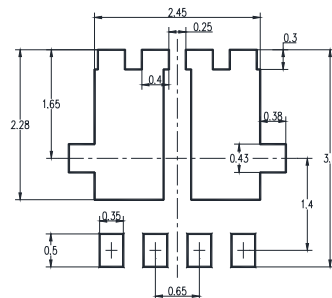
DFN3030



UNIT	A	A1	b	c	D1	D2	D3	D4	D5	E	E1	E2	E3
mm	0.9	0.05	0.35	0.25	2.6	0.5	2.7	3.2	1.135	3.1	3.3	1.85	0.68
	0.7	0	0.24	0.1	2.4	0.3	2.5	3	0.935	2.9	3.1	1.65	0.48

UNIT	E4	E5	E6	e	K	L	L1	L2	L3	θ1
mm	0.43	0.4	0.25	0.7	0.72	0.5	0.1	0.53	0.475	12°
	0.23	0.2	0.15	0.6	0.52	0.3	0	0.33	0.275	0°

Recommended Soldering Footprint



Packing information

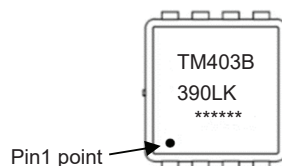
Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
DFN3030	12	8 ± 0.1	0.315 ± 0.004	330	13	5,000

Marking information

" TM403B390LK " = Part No.

" ***** " = Date Code Marking

Font type: Arial



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