

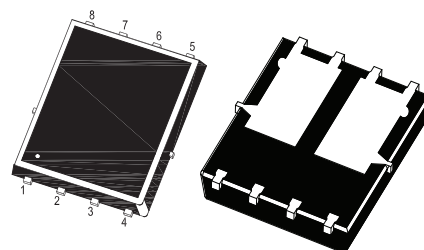
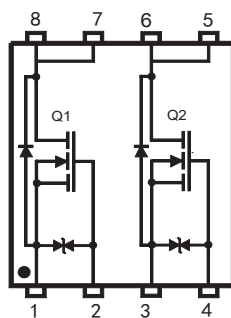
Dual N-Channel Enhancement Mode MOSFET
Features

- Fast switching
- AEC-Q101 Qualified
- Halogen and Antimony Free(HAF), RoHS compliant
- Built-in G-S Protection Diode
- Typical ESD Protection HBM Class 2

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

Applications

- Motor Drive
- Power Tools
- LED Lighting



Q1:1.Source 2.Gate 7.Drain 8.Drain
 Q2:3.Source 4.Gate 5.Drain 6.Drain
 DFN5060 Plastic Package

Key Parameters(Q1/Q2)

Parameter	Value	Unit
BV_{DSS}	60	V
$R_{DS(ON)}$ Max	15 @ $V_{GS} = 10$ V	mΩ
	20 @ $V_{GS} = 4.5$ V	
$V_{GS(th)}$ typ	1.7	V
Q_g typ	14.6 @ $V_{GS} = 10$ 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}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current	I_D	35	A
		21	
Peak Drain Current, Pulsed ¹⁾	I_{DM}	110	A
Single Pulse Avalanche Current	I_{AS}	12.1	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	37	mJ
Total Power Dissipation	P_{tot}	35.7	W
Operating Junction and Storage Temperature Range	T_j, T_{stg}	- 55 to + 175	°C

Thermal Characteristics(Q1/Q2)

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	4.2	°C/W
Thermal Resistance from Junction to Ambient ³⁾	$R_{\theta JA}$	62	°C/W

¹⁾ Pulse Test: Pulse Width ≤ 100 μs, Duty Cycle ≤ 2%, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 175^\circ\text{C}$.

²⁾ Limited by $T_{J(MAX)}$, starting $T_J = 25^\circ\text{C}$, $L = 0.5$ mH, $R_g = 25$ Ω, $I_{AS} = 12.1$ A, $V_{GS} = 10$ V.

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

Characteristics at T_a = 25°C unless otherwise specified(Q1/Q2)

Parameter	Symbol	Min.	Typ.	Max.	Unit
STATIC PARAMETERS					
Drain-Source Breakdown Voltage at I _D = 250 μ A	BV _{DSS}	60	-	-	V
Drain-Source Leakage Current at V _{DS} = 48 V	I _{DSS}	-	-	1	μ A
Gate Leakage Current at V _{GS} = $\pm$ 20 V	I _{GSS}	-	-	$\pm$ 10	μ A
Gate-Source Threshold Voltage at V _{DS} = V _{GS} , I _D = 250 μ A	V _{GS(th)}	1.2	-	2.5	V
Drain-Source On-State Resistance at V _{GS} = 10 V, I _D = 12 A at V _{GS} = 4.5 V, I _D = 7 A	R _{DS(on)}	- -	10.5 -	15 20	m Ω
DYNAMIC PARAMETERS					
Forward Transconductance at V _{DS} = 10 V, I _D = 6 A	g _{fs}	-	11	-	S
Gate Resistance at V _{GS} = 0 V, V _{DS} = 0 V, f = 1 MHz	R _g	-	1.7	-	Ω
Input Capacitance at V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz	C _{iss}	-	782	-	pF
Output Capacitance at V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz	C _{oss}	-	353	-	pF
Reverse Transfer Capacitance at V _{GS} = 0 V, V _{DS} = 30 V, f = 1 MHz	C _{rss}	-	19	-	pF
Total Gate Charge at V _{DS} = 30 V, I _D = 12 A, V _{GS} = 10 V at V _{DS} = 30 V, I _D = 12 A, V _{GS} = 4.5 V	Q _g	- -	14.6 7.2	- -	nC
Gate Source Charge at V _{DS} = 30 V, I _D = 12 A, V _{GS} = 10 V	Q _{gs}	-	2.9	-	nC
Gate Drain Charge at V _{DS} = 30 V, I _D = 12 A, V _{GS} = 10 V	Q _{gd}	-	3.3	-	nC
Turn-On Delay Time at V _{DD} = 30 V, I _D = 12 A, V _{GS} = 10 V, R _g = 6 Ω	t _{d(on)}	-	10	-	ns
Turn-On Rise Time at V _{DD} = 30 V, I _D = 12 A, V _{GS} = 10 V, R _g = 6 Ω	t _r	-	17	-	ns
Turn-Off Delay Time at V _{DD} = 30 V, I _D = 12 A, V _{GS} = 10 V, R _g = 6 Ω	t _{d(off)}	-	9.6	-	ns
Turn-Off Fall Time at V _{DD} = 30 V, I _D = 12 A, V _{GS} = 10 V, R _g = 6 Ω	t _f	-	2.4	-	ns
Body-Diode PARAMETERS					
Drain-Source Diode Forward Voltage at I _S = 11 A, V _{GS} = 0 V	V _{SD}	-	-	1.2	V
Body-Diode Continuous Current	I _S	-	-	35	A
Body-Diode Continuous Current, Pulsed	I _{SM}	-	-	110	A
Body Diode Reverse Recovery Time at I _S = 12 A, di/dt = 100 A / μ s	t _{rr}	-	18	-	ns
Body Diode Reverse Recovery Charge at I _S = 12 A, di/dt = 100 A / μ s	Q _{rr}	-	7	-	nC

Electrical Characteristics Curves(Q1/Q2)

Fig. 1 Typical Output Characteristics

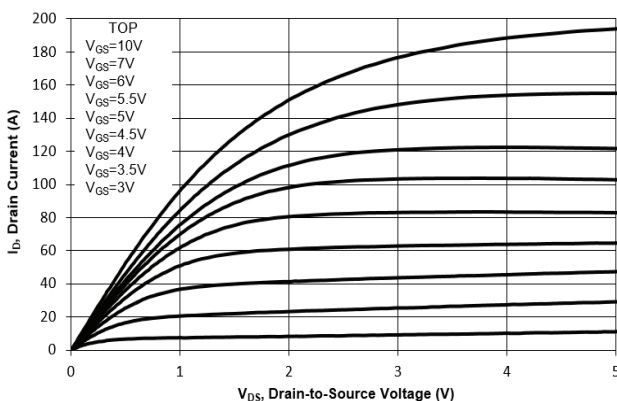


Fig. 2 Typical Transfer Characteristics

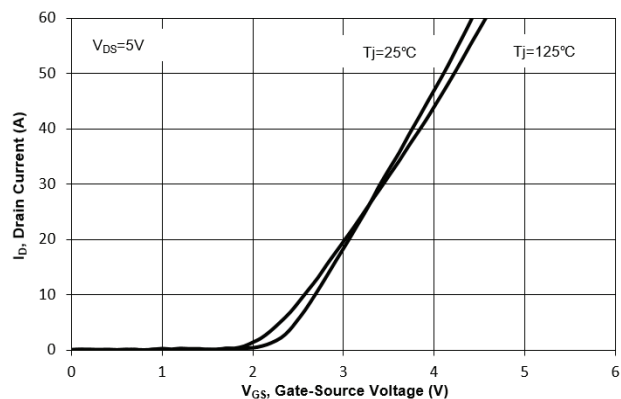


Fig. 3 On-Resistance vs. Drain Current

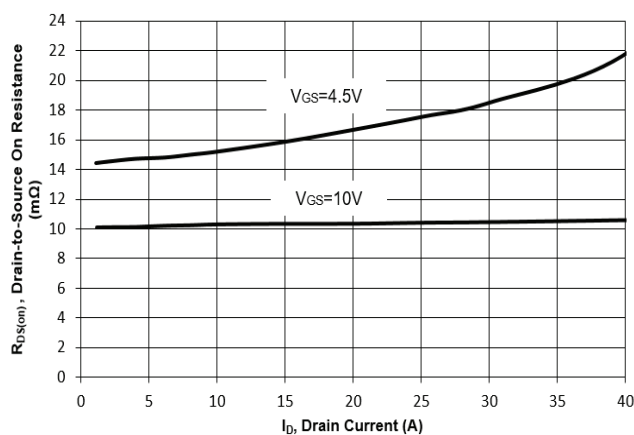


Fig. 4 On-Resistance vs. Gate to Source Voltage

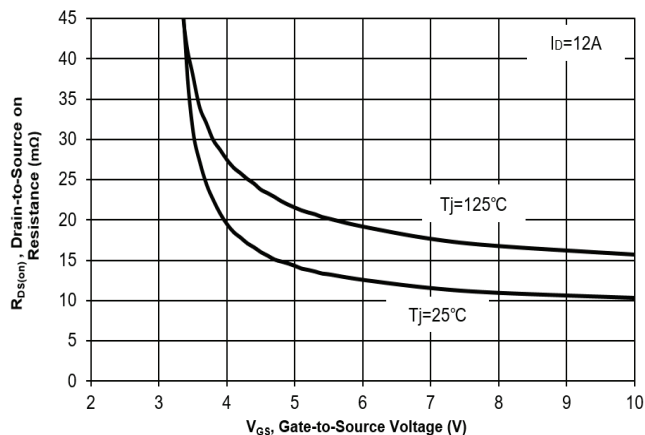


Fig. 5 On-Resistance vs. T_J

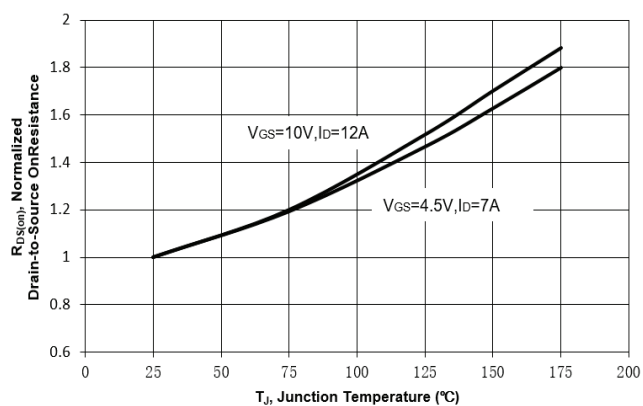
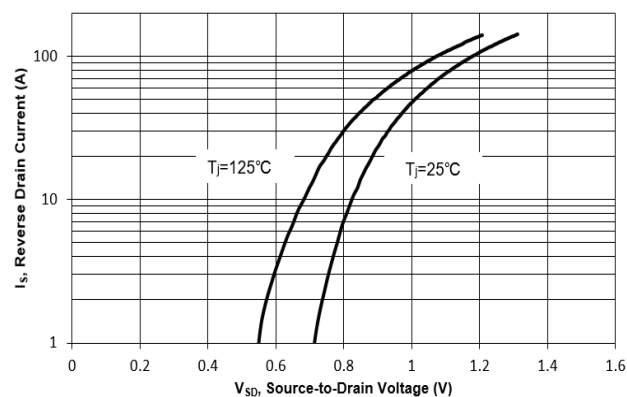


Fig. 6 Typical Forward Body-Diode Characteristics



Electrical Characteristics Curves(Q1/Q2)

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

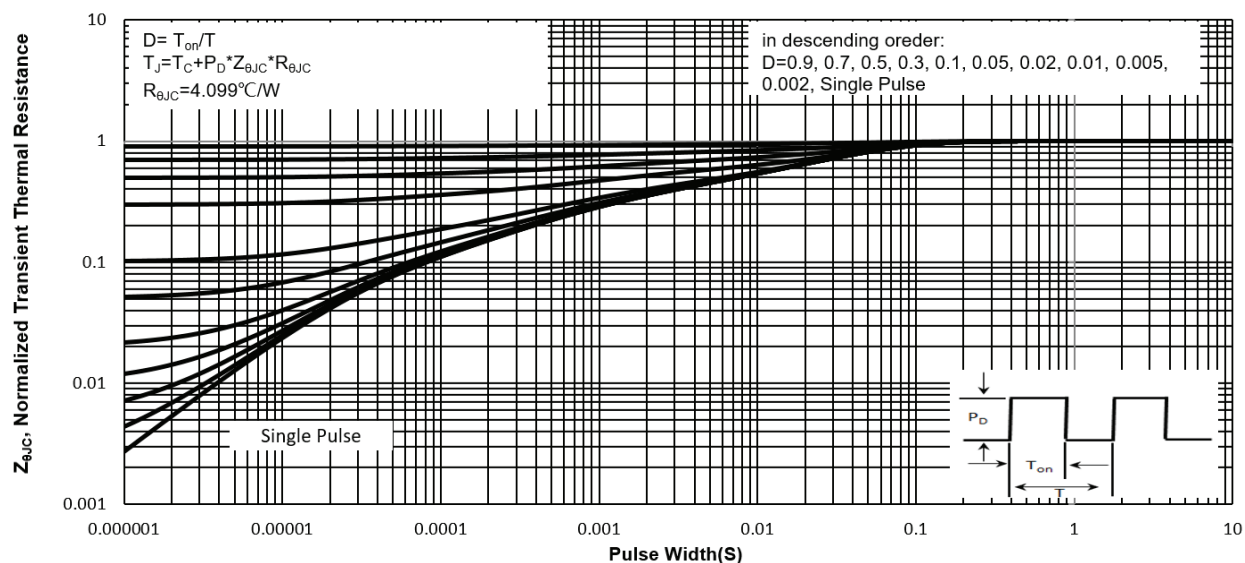


Fig.14 Normalized Maximum Transient Thermal Impedance($z_{\theta JA}$)

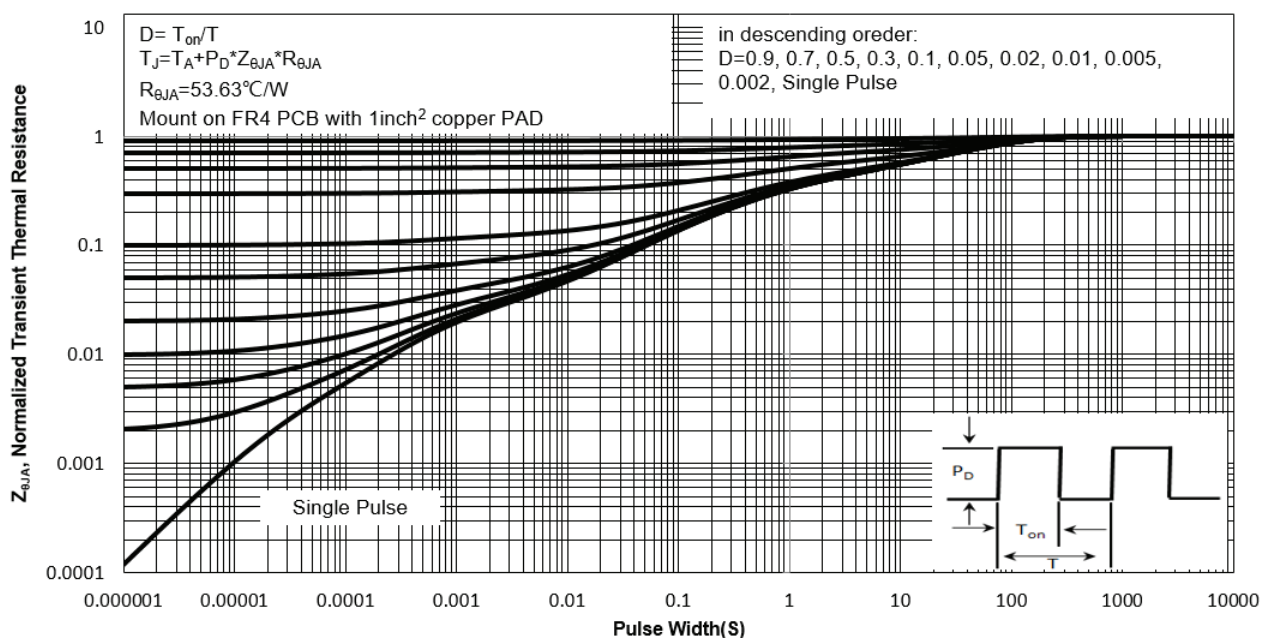


Fig. 7 Typical Junction Capacitance

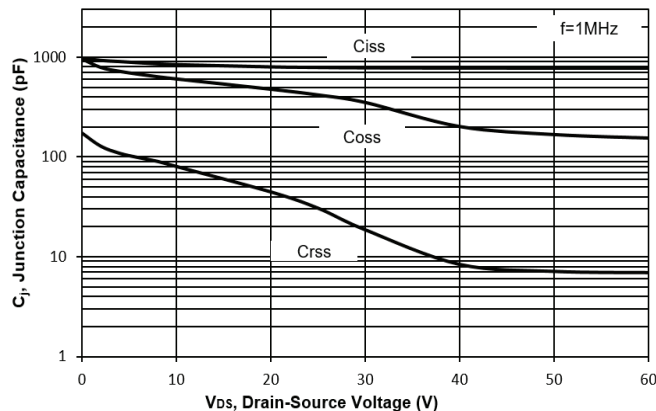


Fig. 8 Drain-Source Leakage Current vs. T_j

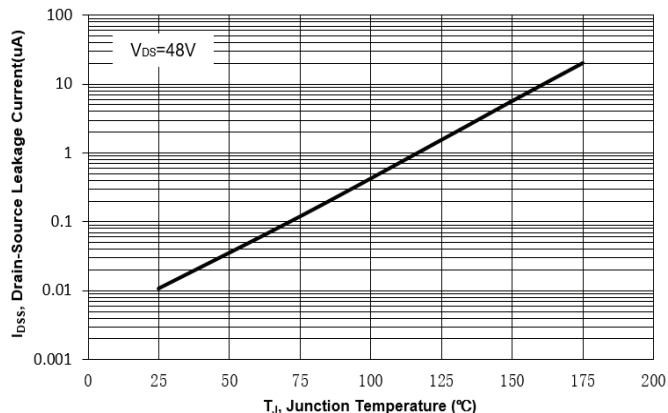


Fig. 9 $V_{(BR)DSS}$ vs. Junction Temperature

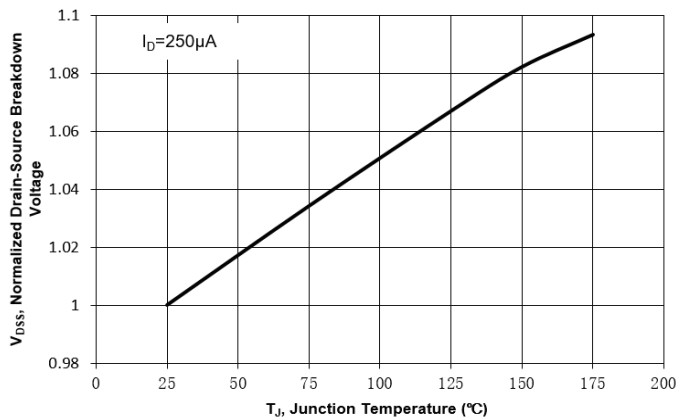


Fig. 10 Gate Threshold Variation vs. T_j

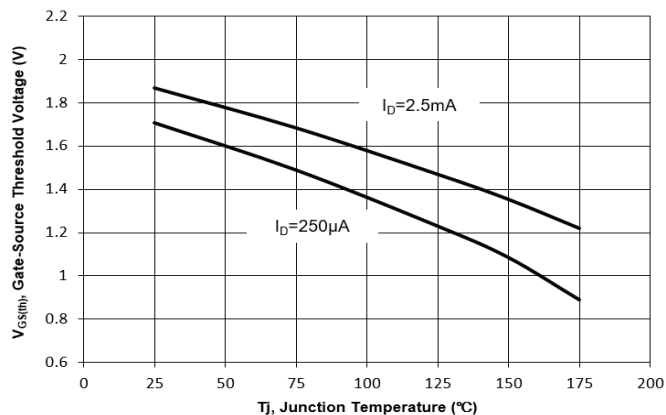


Fig. 11 Gate Charge

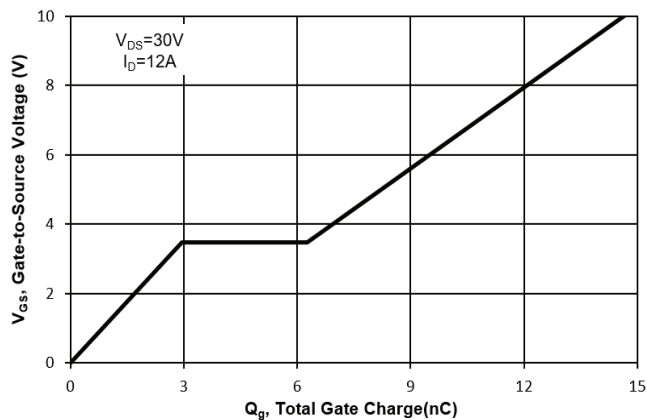
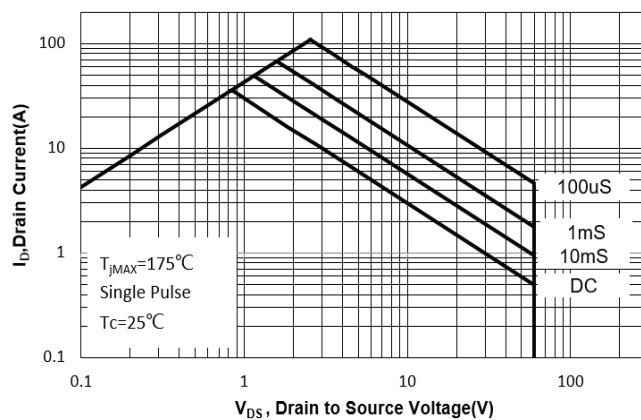
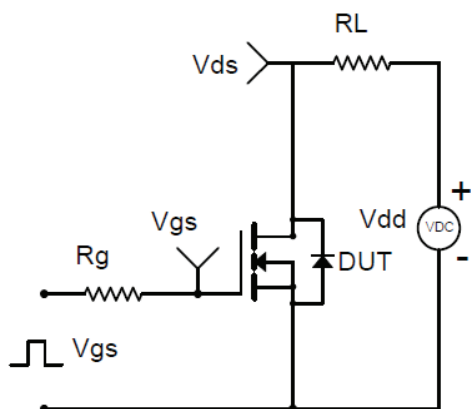
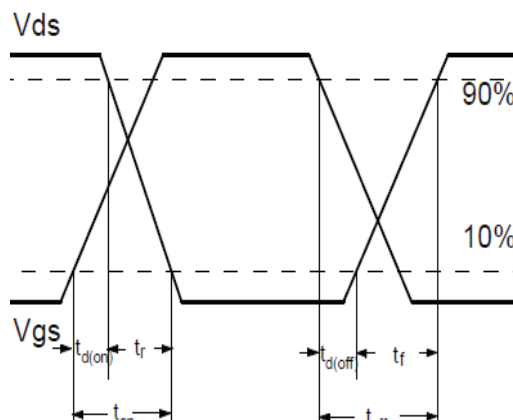
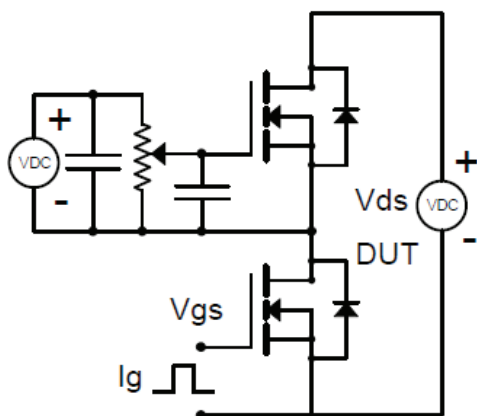
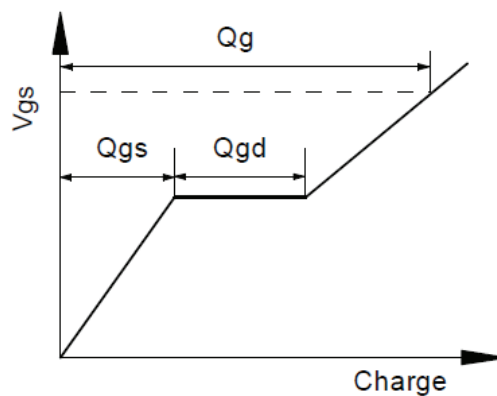
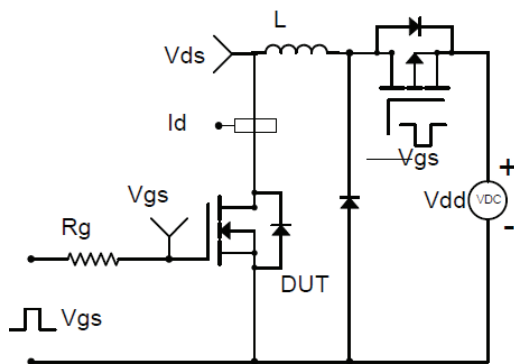
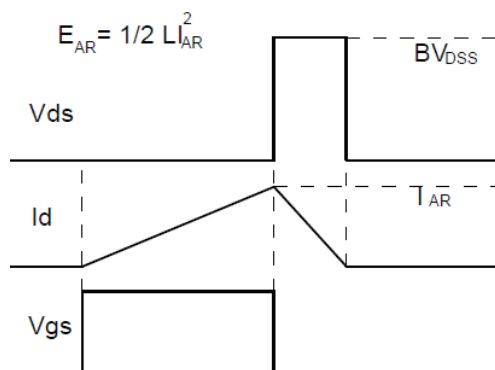


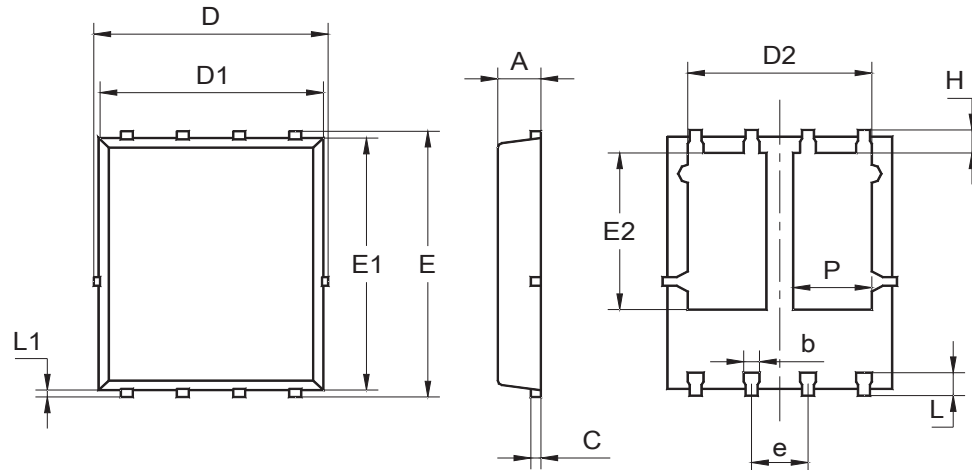
Fig. 12 Safe Operation Area



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


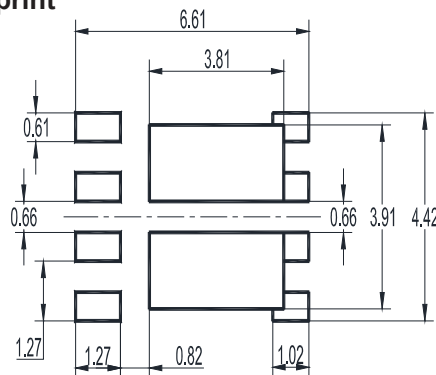
Package Outline Dimensions (Units: mm)

DFN5060



Unit	A	b	C	D	D1	D2	E	E1	E2	e	L	L1	H	P
mm	1.12 0.9	0.51 0.33	0.34 0.11	5.26 4.7	5.1 4.7	4.5 3.56	6.25 5.75	6 5.6	3.66 3.18	1.37 1.17	0.71 0.35	0.2 0.06	0.71 0.35	2.0 1.6

Recommended Soldering Footprint



Packing information

Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
DFN5060	12	8 ± 0.1	0.315 ± 0.004	330	13	5,000

Marking information

" DM606D150LSZK " = Part No

" ***** " = Date Code Marking

Font type: Arial

Pin1 point



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