

MMD65R900Q

650V 0.90Ω N-channel MOSFET

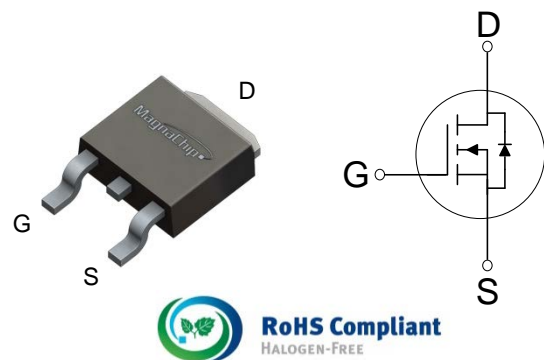
■ Description

MMD65R900Q is power MOSFET using MagnaChip's advanced super junction technology that can realize very low on-resistance and gate charge. It will provide much high efficiency by using optimized charge coupling technology. These user friendly devices give an advantage of low EMI to designers as well as low switching loss.

■ Key Parameters

Parameter	Value	Unit
$V_{DS} @ T_{j, max}$	700	V
$R_{DS(on), max}$	0.90	Ω
$V_{GS(th), typ}$	3	V
I_D	4.7	A
Q_g, typ	11.1	nC

■ Package & Internal Circuit



■ Features

- Low power loss by high speed switching and low on-resistance
- 100% avalanche tested
- Green package – Pb-free plating, Halogen-free

■ Applications

- PFC power supply stages
- Switching applications
- Adapter

■ Ordering Information

Order Code	Marking	Temp. Range	Package	Packing	RoHS Status
MMD65R900QRH	65R900Q	-55 ~ 150°C	TO-252(DPAK)	Reel	compliant

■ Absolute Maximum Rating ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Rating	Unit	Note
Drain – source voltage	V_{DSS}	650	V	
Gate – source voltage	V_{GSS}	± 30	V	
Continuous drain current	I_D	4.7	A	$T_C = 25^\circ\text{C}$
		3.0	A	$T_C = 100^\circ\text{C}$
Pulsed drain current ⁽¹⁾	I_{DM}	14.1	A	
Power dissipation	P_D	34.7	W	
Single - pulse avalanche energy	E_{AS}	50	mJ	
MOSFET dv/dt ruggedness	dv/dt	50	V/ns	
Diode dv/dt ruggedness ⁽²⁾	dv/dt	15	V/ns	
Storage temperature	T_{stg}	-55 ~150	$^\circ\text{C}$	
Maximum operating junction temperature	T_j	150	$^\circ\text{C}$	

1) Pulse width t_P limited by $T_{j,max}$.

2) $I_{SD} \leq I_D$, $V_{DS\ peak} \leq V_{(BR)DSS}$.

■ Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance, junction-case max	R_{thjc}	3.4	$^\circ\text{C/W}$
Thermal resistance, junction-ambient max ⁽³⁾	R_{thja}	62	$^\circ\text{C/W}$

3) Device mounted on minimal footprint of PCB.

■ Static Characteristics (T_c=25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Drain – source breakdown voltage	V _{(BR)DSS}	650	-	-	V	V _{GS} = 0V, I _D = 250uA
Gate threshold voltage	V _{GS(th)}	2	3	4	V	V _{DS} = V _{GS} , I _D = 250uA
Zero gate voltage drain current	I _{DSS}	-	-	1	uA	V _{DS} = 650V, V _{GS} = 0V
Gate leakage current	I _{GSS}	-	-	100	nA	V _{GS} = ±30V, V _{DS} = 0V
Drain-source on state resistance	R _{DS(ON)}	-	0.8	0.9	Ω	V _{GS} = 10V, I _D = 1.5A

■ Dynamic Characteristics (T_c=25°C unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Input capacitance	C _{iss}	-	384	-	pF	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz
Output capacitance	C _{oss}	-	439	-		
Reverse transfer capacitance	C _{riss}	-	19.5	-		
Effective output capacitance energy related ⁽⁴⁾	C _{o(er)}	-	14.5	-		
Turn on delay time	t _{d(on)}	-	13.5	-	ns	V _{GS} = 10V, R _G = 25Ω, V _{DS} = 325V, I _D = 4.7A
Rise time	t _r	-	24	-		
Turn off delay time	t _{d(off)}	-	56	-		
Fall time	t _f	-	23.5	-		
Total gate charge	Q _g	-	11.1	-	nC	V _{GS} = 10V, V _{DS} = 520V, I _D = 4.7A
Gate – source charge	Q _{gs}	-	4.5	-		
Gate – drain charge	Q _{gd}	-	2.6	-		
Gate resistance	R _G	-	20	-	Ω	V _{GS} = 0V, f = 1.0MHz

4) C_{o(er)} is a capacitance that gives the same stored energy as C_{oss} while V_{DS} is rising from 0V to 80% V_{(BR)DSS}

■ Reverse Diode Characteristics ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Continuous diode forward current	I_S	-	-	4.7	A	
Diode forward voltage	V_{SD}	-	-	1.4	V	$I_S = 4.7\text{A}$, $V_{GS} = 0\text{V}$
Reverse recovery time	t_{rr}	-	263	-	ns	$I_S = 4.7\text{A}$ $di/dt = 100\text{A/us}$ $V_{DD} = 100\text{V}$
Reverse recovery charge	Q_{rr}	-	1.9	-	μC	
Reverse recovery current	I_{rrm}	-	14.4	-	A	

■ Characteristic Graph

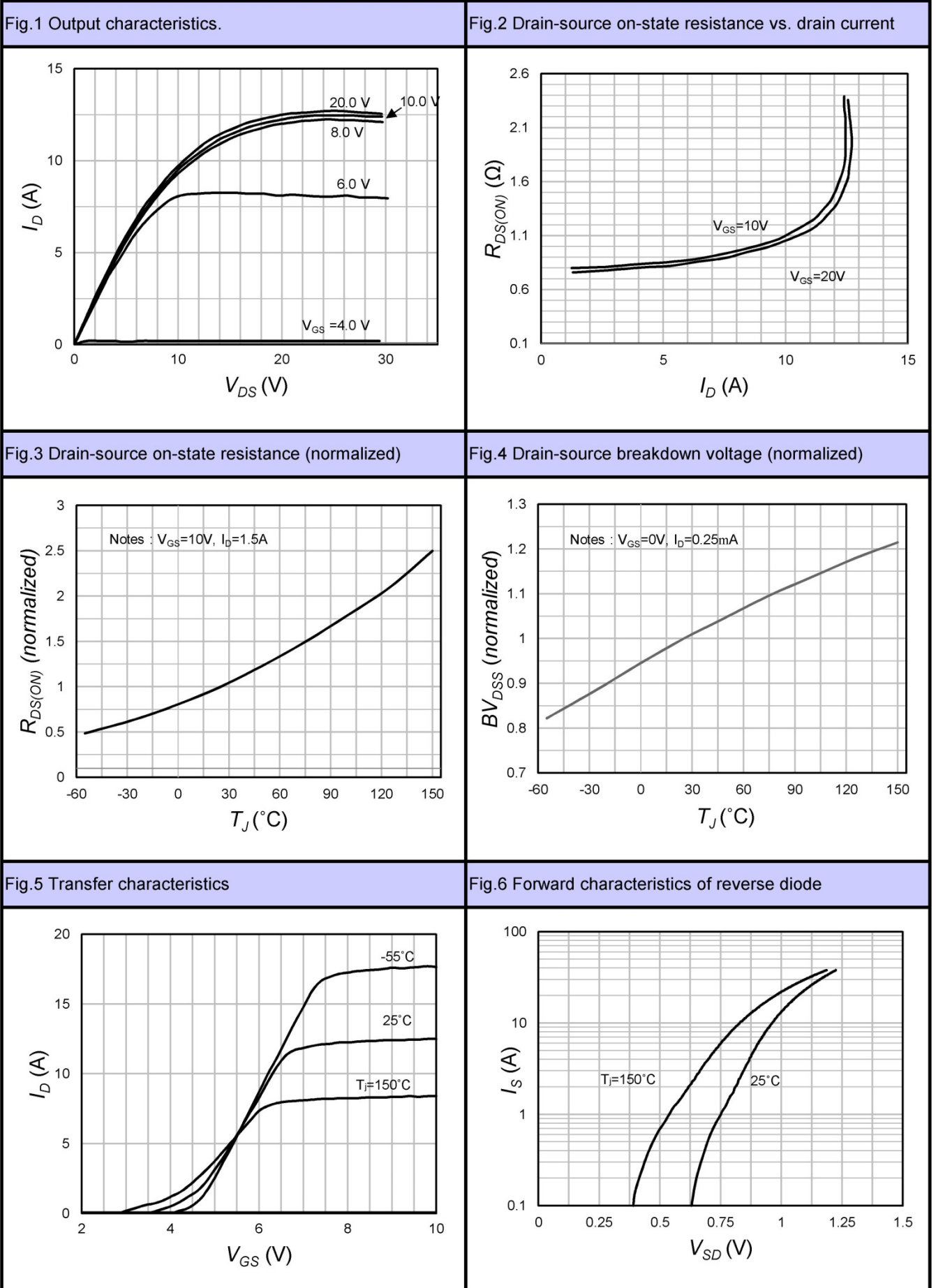


Fig.7 Gate charge

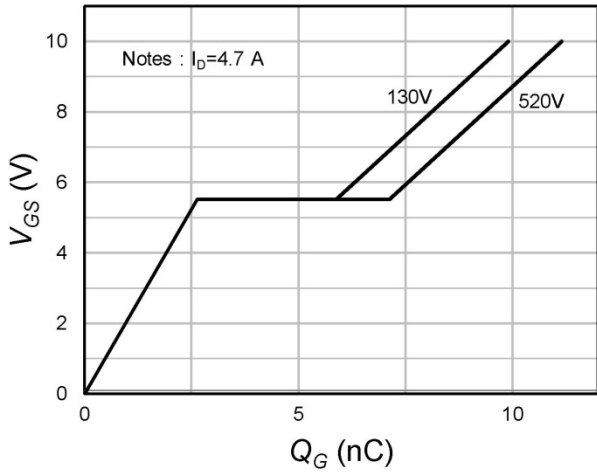


Fig.8 Capacitance characteristics

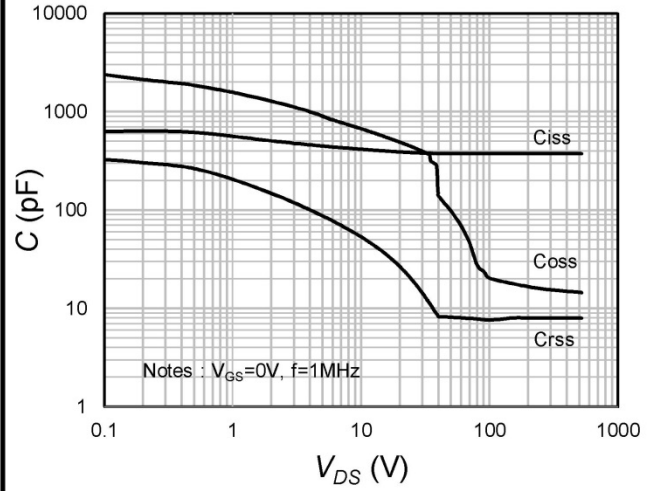


Fig.9 VGS(th) variation vs. temprature (nomalized)

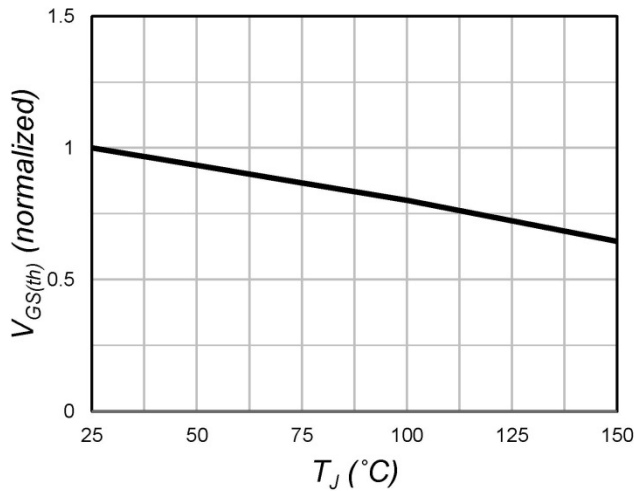


Fig.10 Maximum drain current vs. case temperature

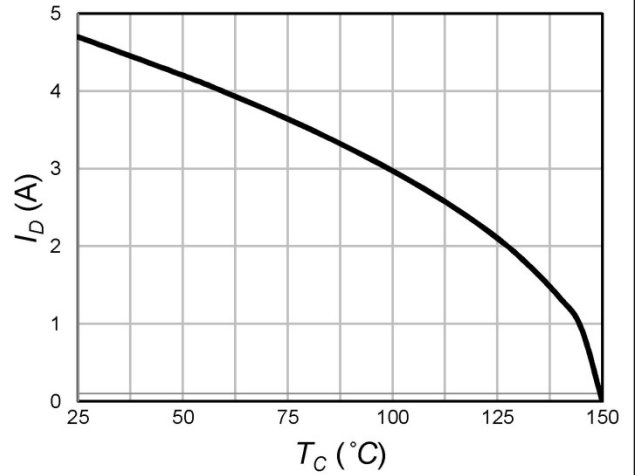


Fig.11 Power dissipation

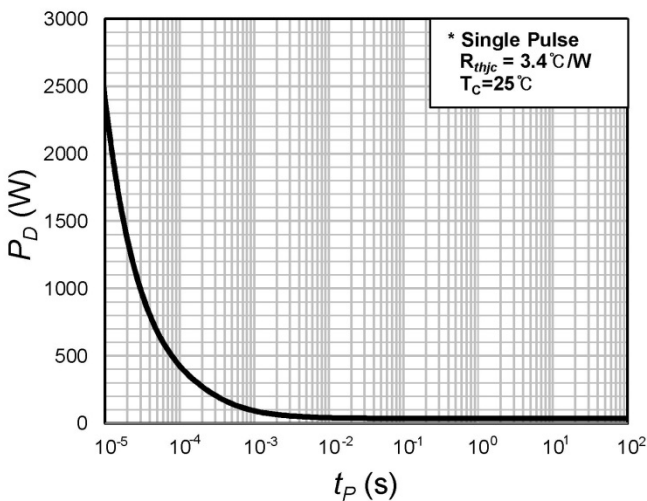


Fig.12 Output capacitance stored energy

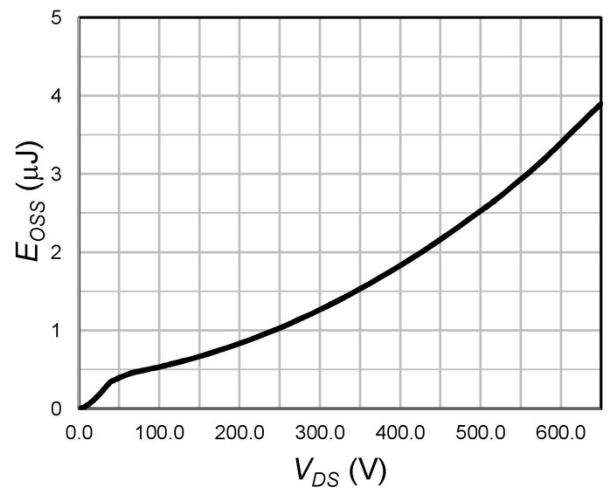


Fig.13 Transient thermal impedance

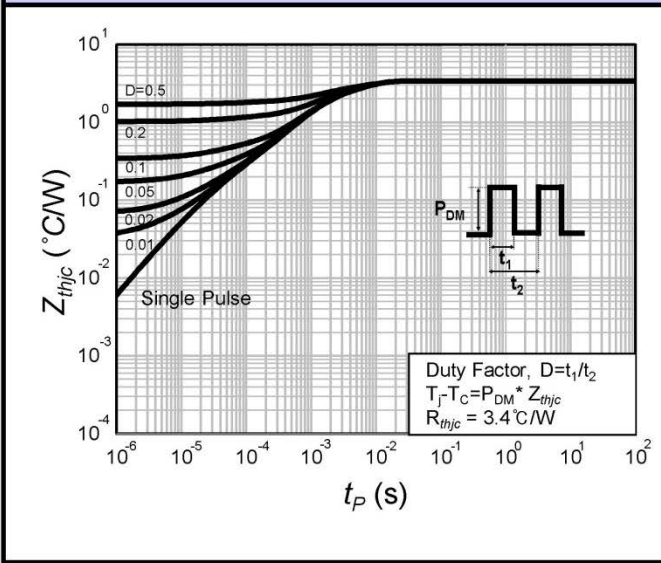
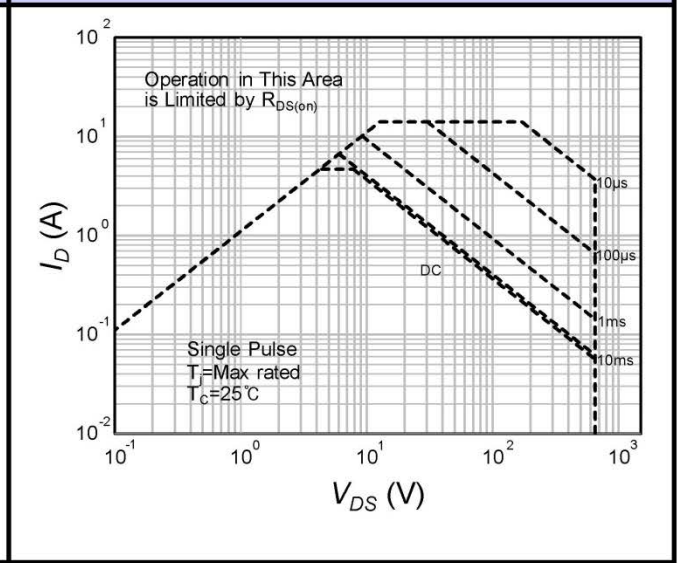


Fig.14 Safe operating area



■ Test Circuit

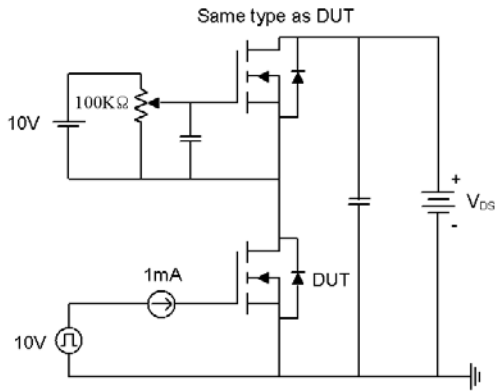


Fig15-1. Gate charge measurement circuit

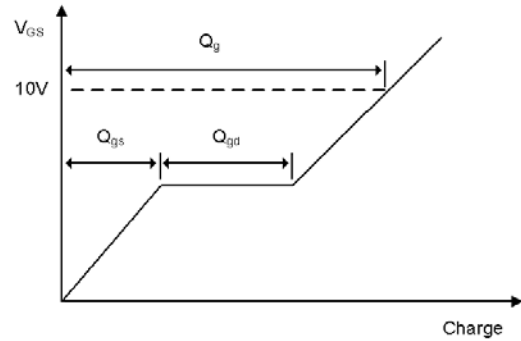


Fig15-2. Gate charge waveform

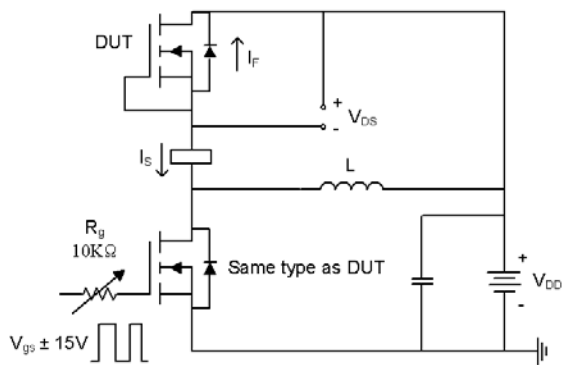


Fig16-1. Diode reverse recovery test circuit

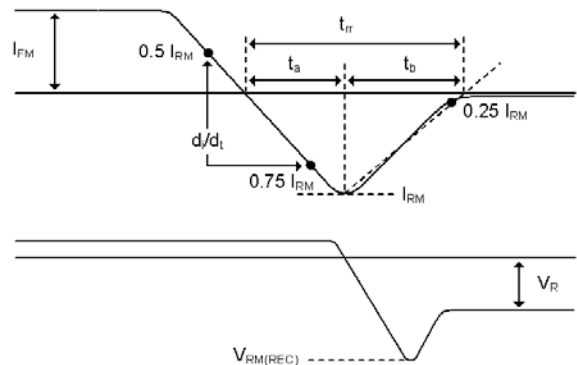


Fig16-2. Diode reverse recovery test waveform

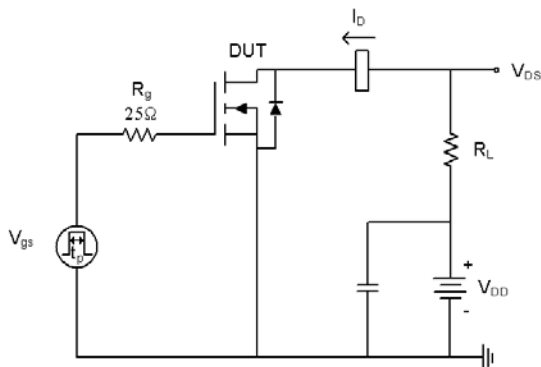


Fig17-1. Switching time test circuit for resistive load

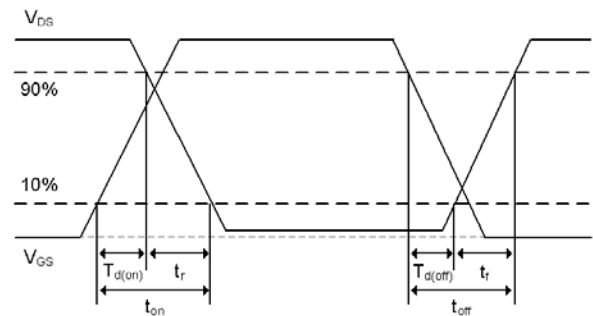


Fig17-2. Switching time waveform

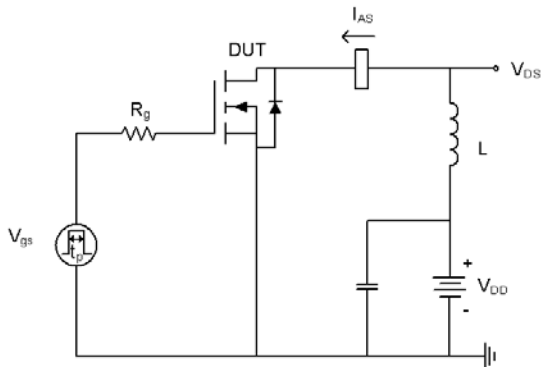


Fig18-1. Unclamped inductive load test circuit

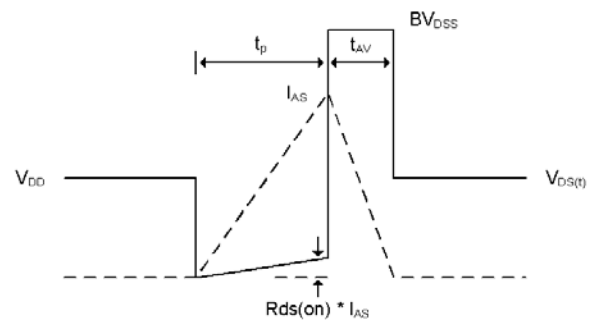
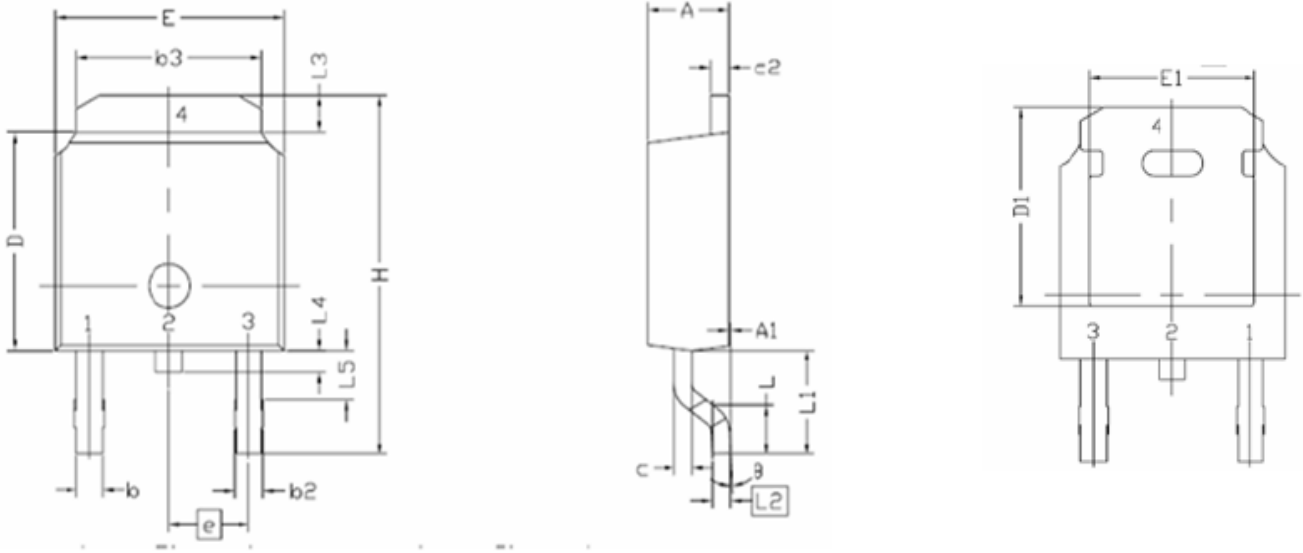



Fig18-2. Unclamped inductive waveform

■ Physical Dimension
TO-252(D- PAK)

[Unit:mm]

Symbol	Min.	Nom.	Max.
E	6,35	-	6,73
L	1,40	1,52	1,78
L1	2,74 REF		
L2	0,508 BCS		
L3	0,89	-	1,27
L4	-	-	1,02
L5	1,14	-	1,52
D	5,97	6,10	6,22
H	9,40	-	10,41
b	0,64	-	0,89
b2	0,76	-	1,14
b3	4,95	-	5,46
e	2,286 BSC		
A	2,18	-	2,39
A1	-	-	0,13
c	0,46	-	0,61
c2	0,46	-	0,89
D1	5,21	-	-
E1	4,32	-	-
ϕ	0,00	-	10,00

DISCLAIMER:

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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