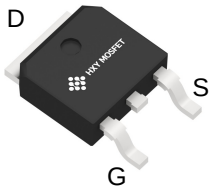
IPD50R1K4CEBTMA1

N-Channel Enhancement Mode MOSFET

Description

The IPD50R1K4CEBTMA1 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

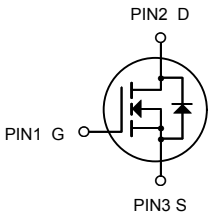


TO-252-2L (DPAK)

General Features

V_{DS} = 500V I_D = 5A

$R_{DS(ON)}$ < 1.3Ω @ V_{GS}=10V



N-Channel MOSFET

Application

PWM Application

Load switch

Power Management

Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
IPD50R1K4CEBTMA1	TO-252-2L (DPAK)	HXY MOSFET	2500

Absolute Maximum Ratings (T_C=25°C unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	500	V
V_{GS}	Gate-Source Voltage	±30	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	5	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	3	A
I_{DM}	Pulsed Drain Current[2]	20	A
EAS	Single Pulse Avalanche Energy[3]	137	mJ
P_D@T_C=25℃	Total Power Dissipation[4]	83	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	33	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	1.5	℃/W

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	500	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 500V, V_{GS} = 0V	-	-	1.0	μA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±30V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250μA	2	3.4	3.6	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(4)	V_{GS} = 10V, I_D = 2.5A	-	1.30	1.50	Ω
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 25V, f = 1MHz	-	582	-	pF
C_{oss}	Output Capacitance		-	42	-	pF
C_{rss}	Reverse Transfer Capacitance		-	4	-	pF
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 250V, I_D = 2A	-	14	-	nC
Q_{gs}	Gate Source Charge		-	3.3	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	4	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On DelayTime	V_{GS} = 10V, V_{DD} = 240V I_D= 2A, R_{GEN} = 24Ω	-	12	-	ns
t_r	Turn-On Rise Time		-	17	-	ns
$t_{d(off)}$	Turn-Off DelayTime		-	45	-	ns
t_f	Turn-Off Fall Time		-	25	-	ns
Drain-Source Diode Characteristics and Max Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	5	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	20	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S = 5A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	I_F = 5A, di/dt = 100A/us	-	340	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	2.9	-	μC

Notes:
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25C, V_{DD}=50V, V_G=10V, R_G=25ohm, L=10mH, I_{AS}=5.3A
3. RθJA is measured with the device mounted on a minimum recommended pad of 2oz copper FR4 PCB
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%.

Typical Characteristics

Figure 1: Output Characteristics

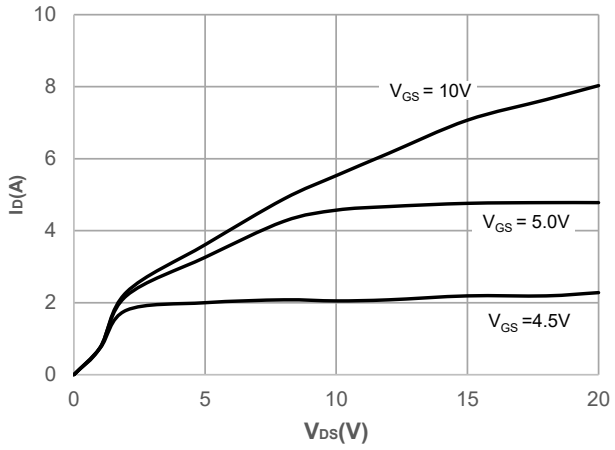


Figure 2: Typical Transfer Characteristics

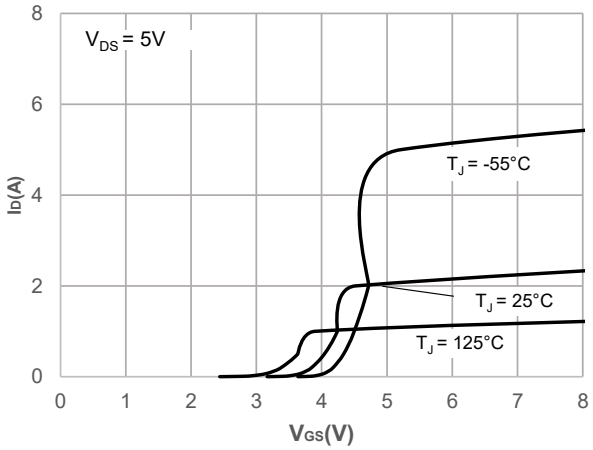


Figure 3: On-resistance vs. Drain Current

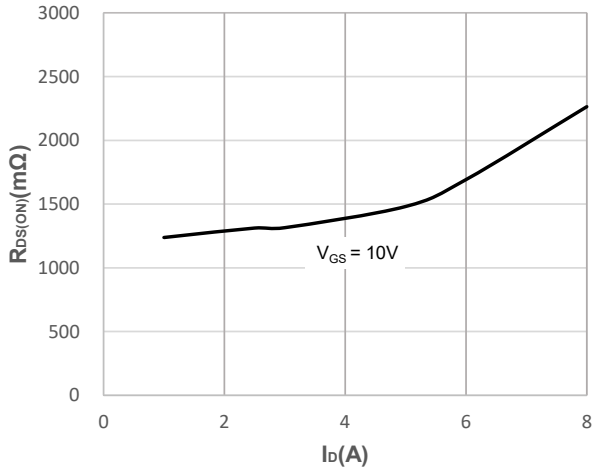


Figure 4: Body Diode Characteristics

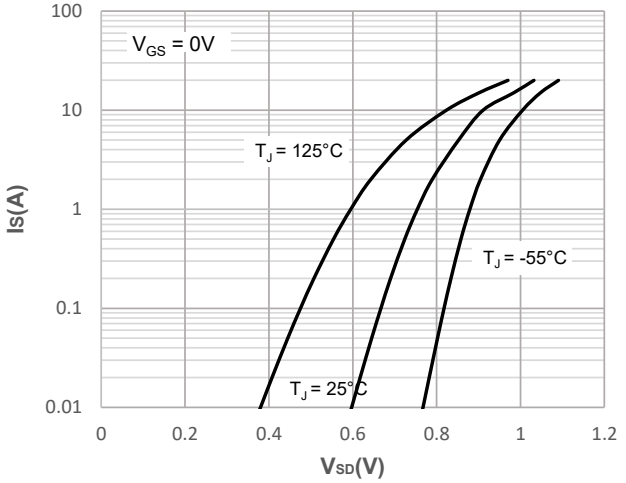


Figure 5: Gate Charge Characteristics

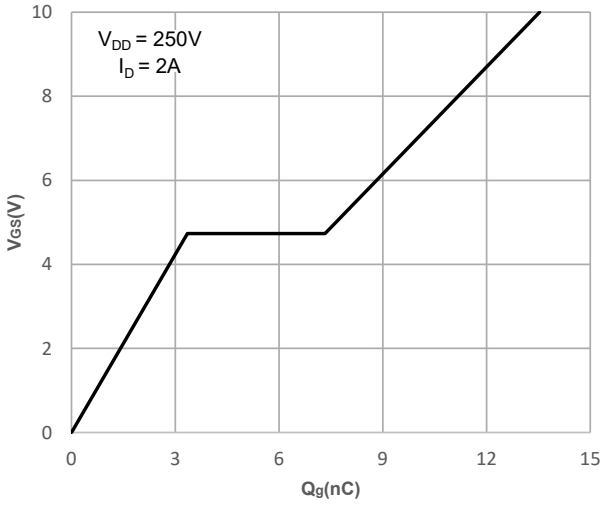


Figure 6: Capacitance Characteristics

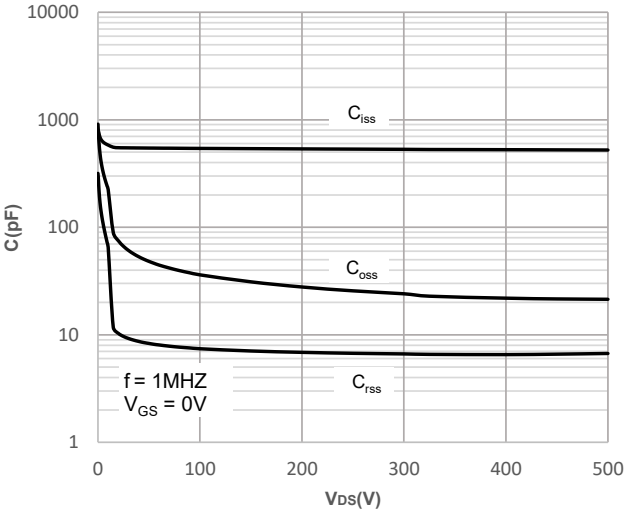


Figure 7: Normalized Breakdown voltage vs. Junction Temperature

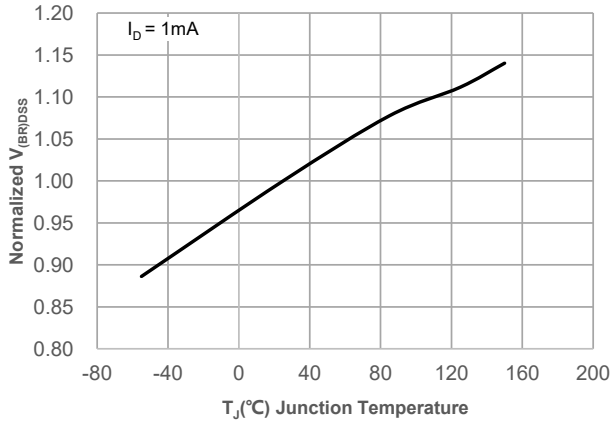


Figure 8: Normalized on Resistance vs. Junction Temperature

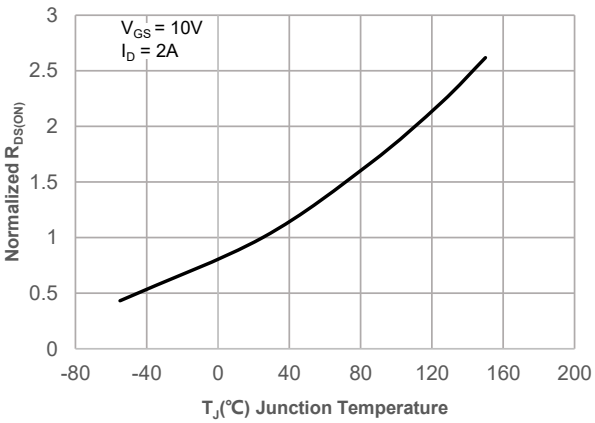


Figure 9: Maximum Safe Operating Area

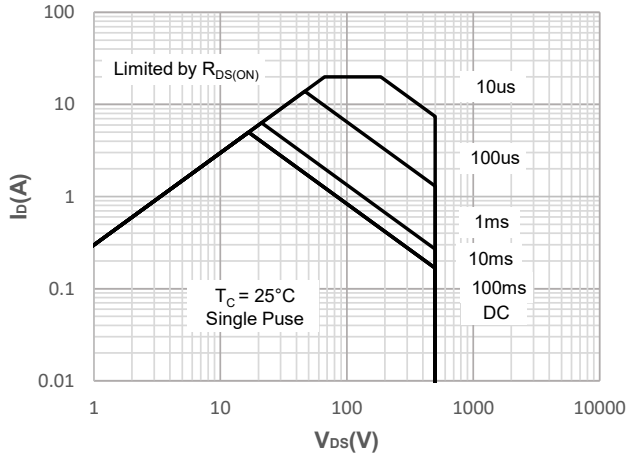


Figure 10: Maximum Continuous Drian Current vs. Case Temperature

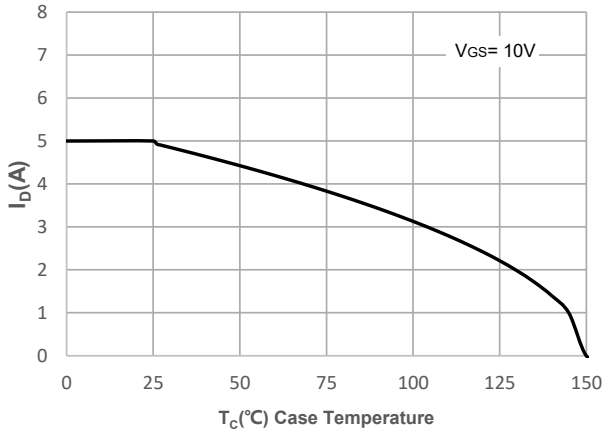


Figure 11: Normalized Maximum Transient Thermal Impedance

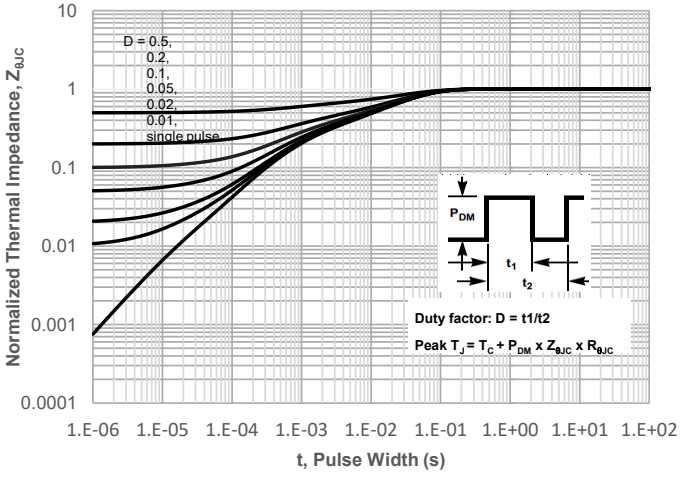
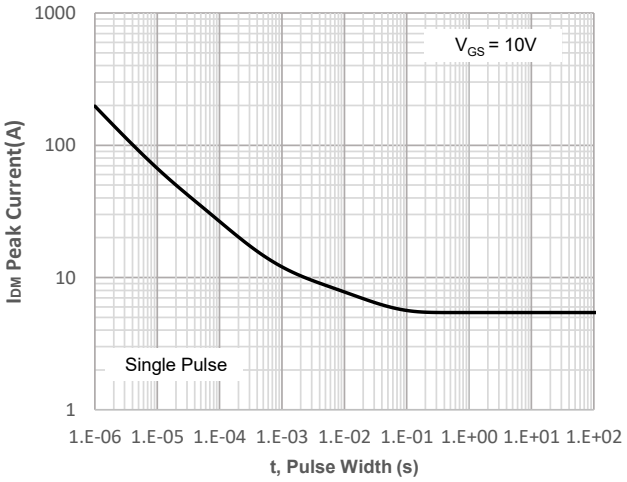


Figure 12: Peak Current Capacity



Test Circuit

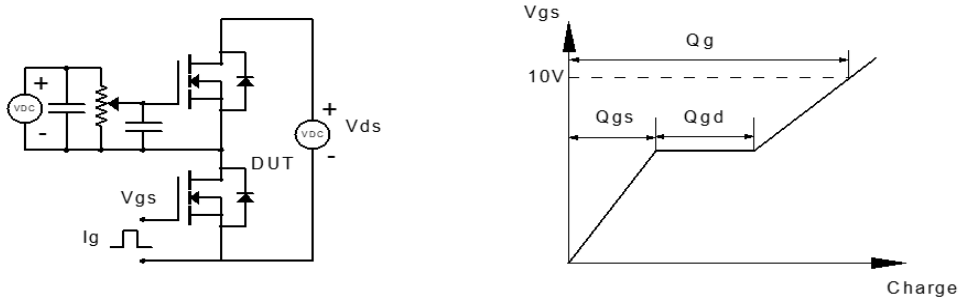


Figure 1: Gate Charge Test Circuit & Waveform

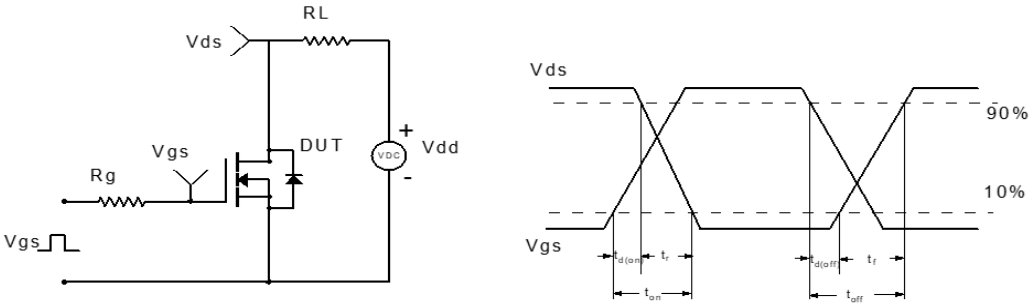


Figure 2: Resistive Switching Test Circuit & Waveform

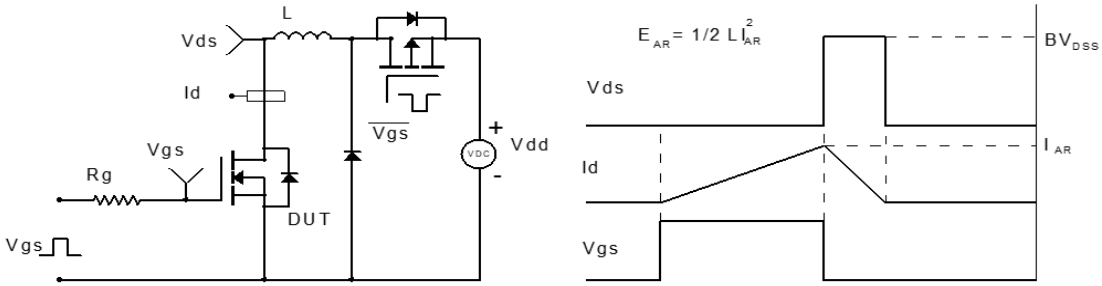


Figure 3: Unclamped Inductive Switching Test Circuit& Waveform

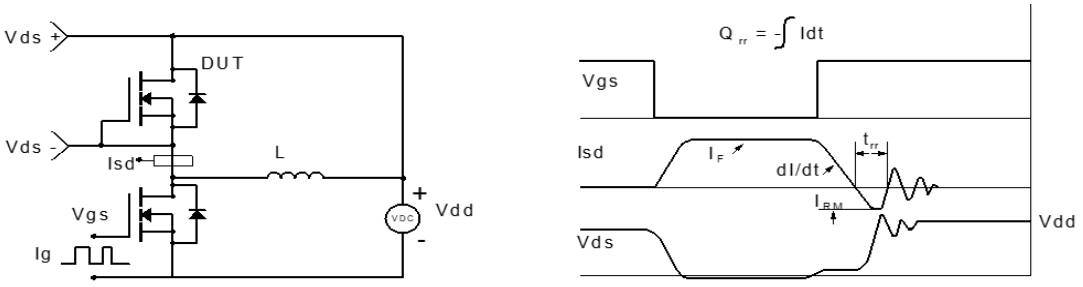
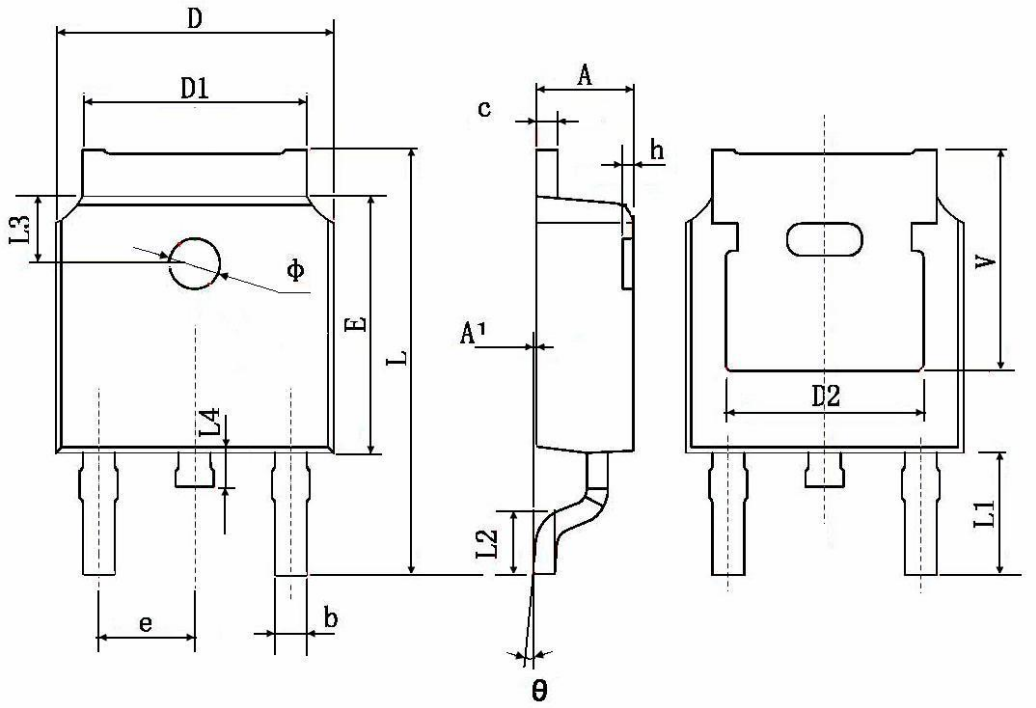


Figure 4: Diode Recovery Test Circuit & Waveform

TO-252-2L(DPAK) Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	0.483 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	

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