SI3415D-TP

P-Channel Enhancement Mode MOSFET

Description

The SI3415D-TP uses advanced trench technology to provide excellent $R_{DS(ON)}$, lowgatechargeandoperation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications .It is ESD protested.



SOT-23

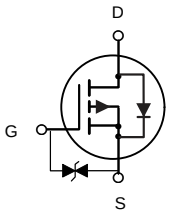
General Features

V_{DS} = -20V,I_D =-5A

$R_{DS(ON)}$ < 40mΩ @ V_{GS}=-4.5V

$R_{DS(ON)}$ < 60mΩ @ V_{GS}=-2.5V

ESD Rating: 1500V HBM



P-Channel MOSFET

Application

PWM application

Load switch

Ordering Information

Product ID	Pack	Brand	Qty(PCS)
SI3415D-TP	SOT-23	HXY MOSFET	3000

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

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±10	V
I_D	Drain Current-Continuous	-5	A
I_{DM}	Drain Current-Pulsed (Note 1)	-30	A
P_D	Maximum Power Dissipation	1.4	W
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	°C
$R_{\theta JA}$	Thermal Resistance,Junction-to-Ambient (Note 2)	89.3	°C/W

Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-20		-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V,V_{GS}= 0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V,V_{DS}= 0V	-	-	±10	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-0.35	-0.55	-0.9	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D= -4A	-	30	40	mΩ
		V_{GS}=-2.5V, I_D=-4A	-	44	60	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D= -4A	8	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-10V,V_{GS}=0V, F=1.0MHz	-	950	-	PF
Output Capacitance	C_{oss}		-	165	-	PF
Reverse Transfer Capacitance	C_{rss}		-	120	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-10V,R_L=2. 5Ω V_{GS}=-4.5V,R_{GEN}=3Ω	-	12		nS
Turn-on Rise Time	t_r		-	10		nS
Turn-Off Delay Time	$t_{d(off)}$		-	19		nS
Turn-Off Fall Time	t_f		-	25		nS
Total Gate Charge	Q_g	V_{DS}=-10V,I_D=-4A, V_{GS}=-4.5V	-	12		nC
Gate-Source Charge	Q_{gs}		-	1.4	-	nC
Gate-Drain Charge	Q_{gd}		-	3.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-4A	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-4	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on FR4 Board, t ≤ 10 sec.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

Typical Electrical And Thermal Characteristics

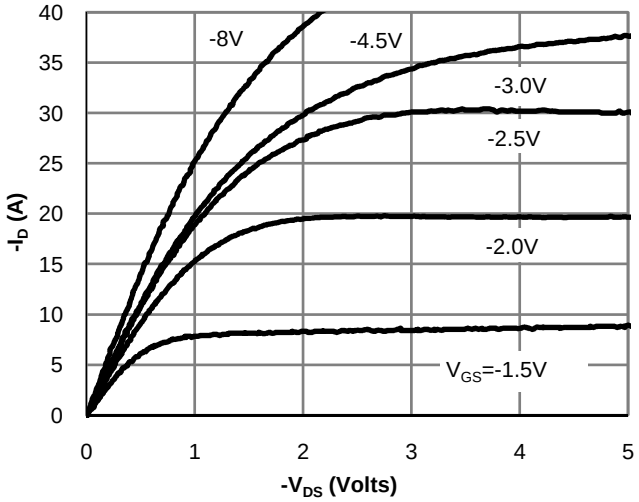


Fig 1: On-Region Characteristics (Note E)

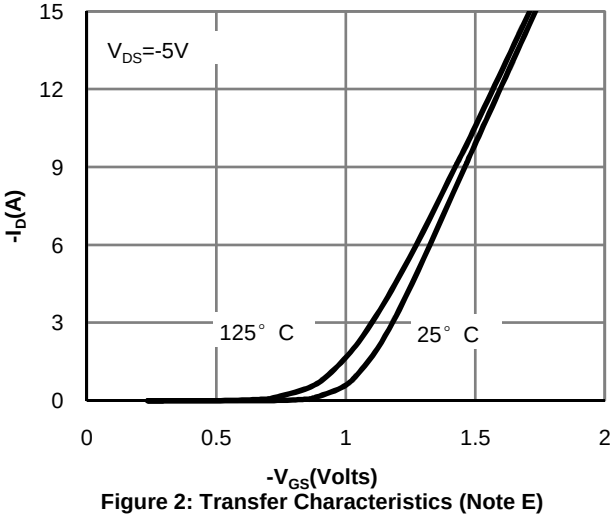


Figure 2: Transfer Characteristics (Note E)

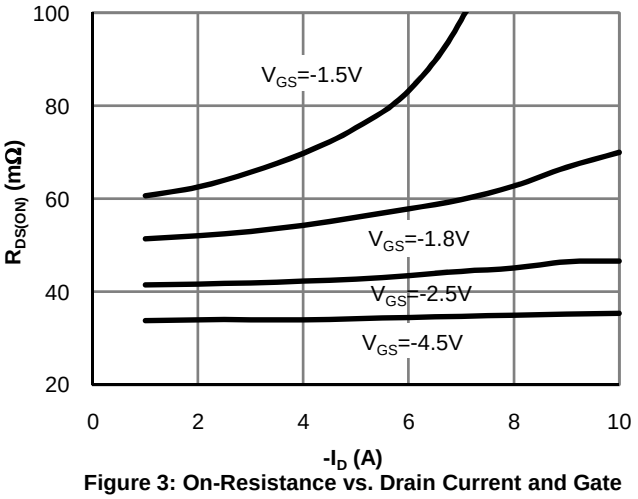


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

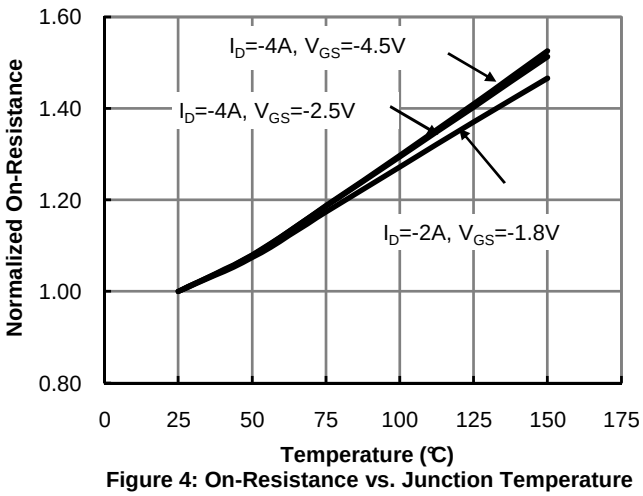


Figure 4: On-Resistance vs. Junction Temperature (Note E)

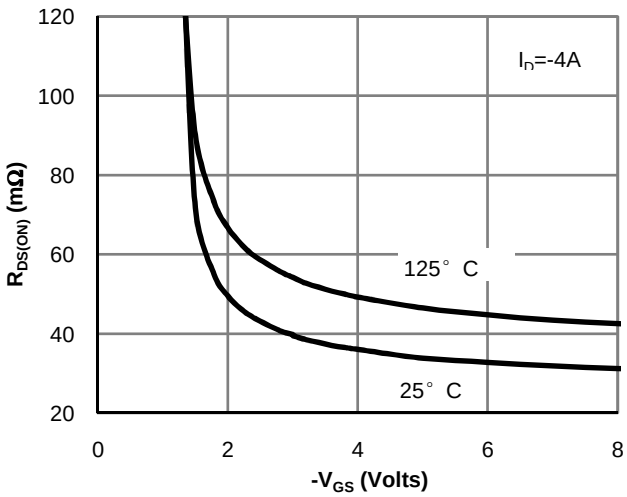


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

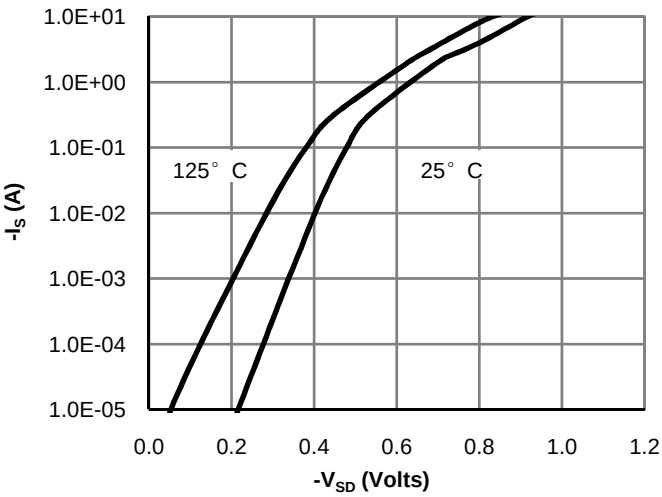


Figure 6: Body-Diode Characteristics (Note E)

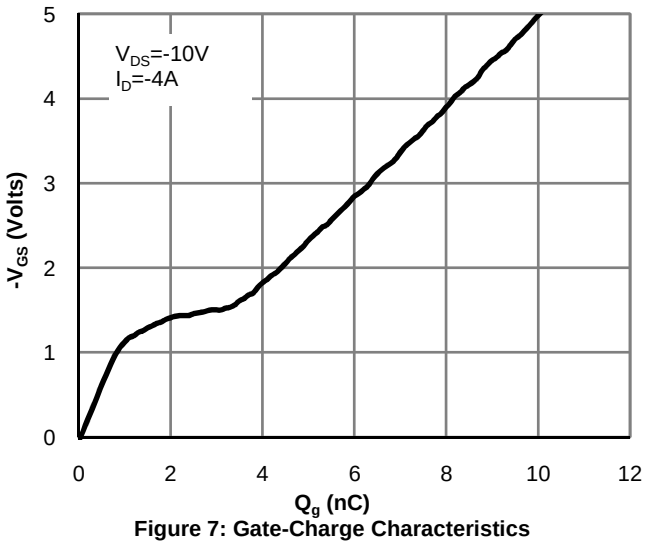


Figure 7: Gate-Charge Characteristics

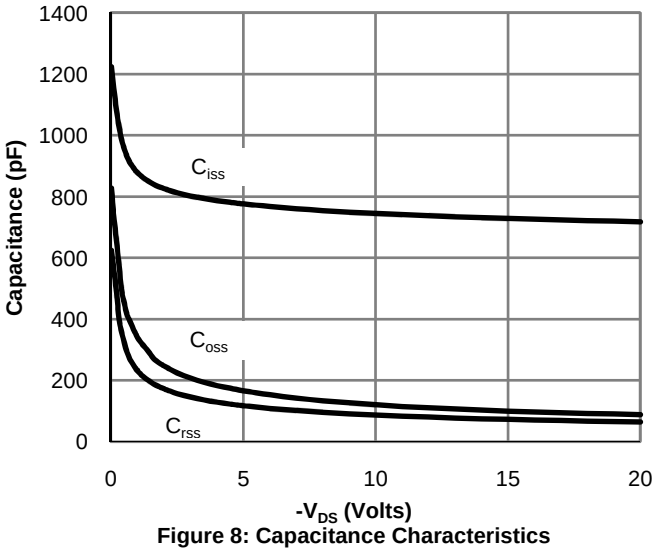


Figure 8: Capacitance Characteristics

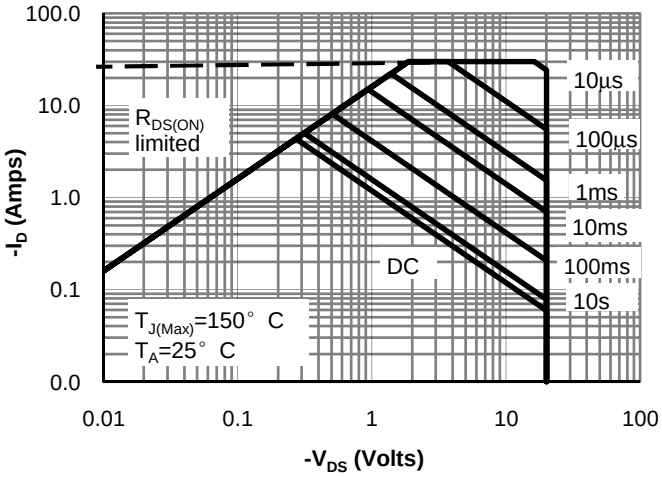


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

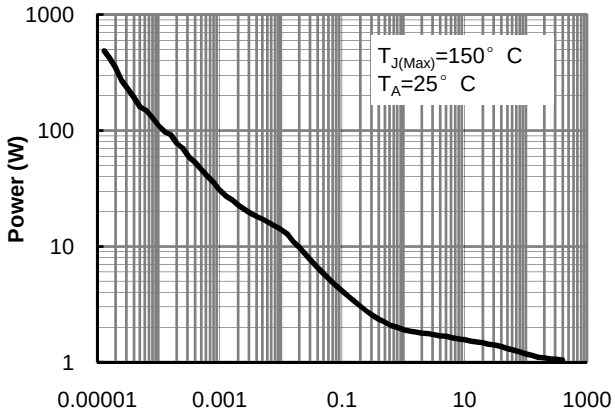


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

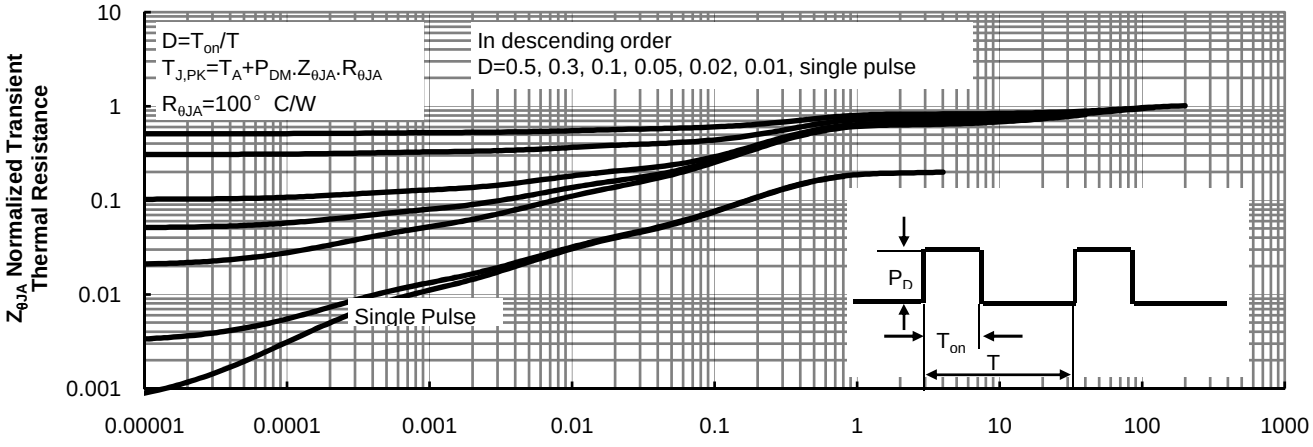
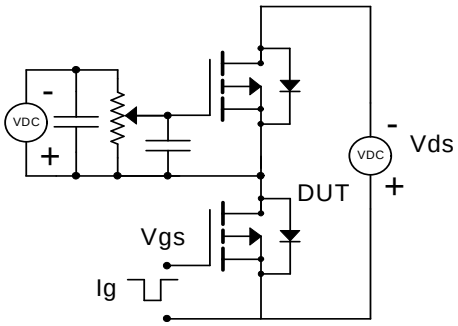
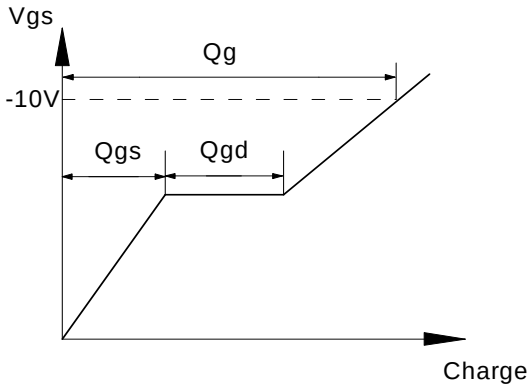


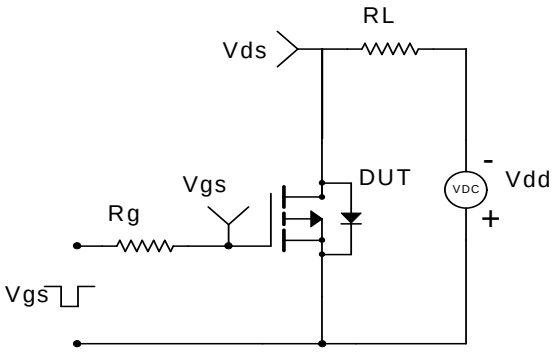
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

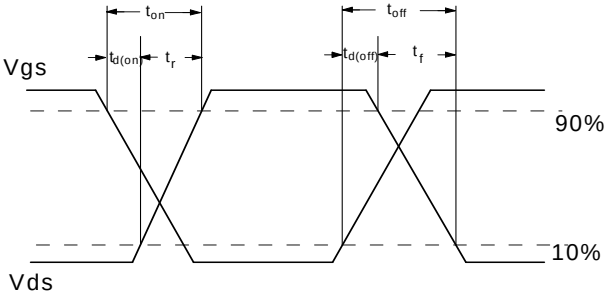
Gate Charge Test Circuit & Waveform



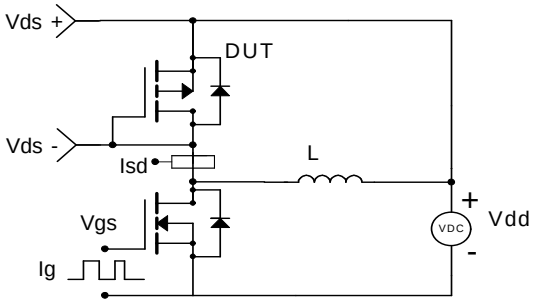


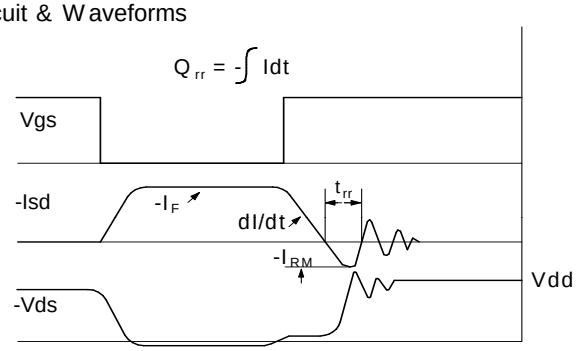
Resistive Switching Test Circuit & Waveforms



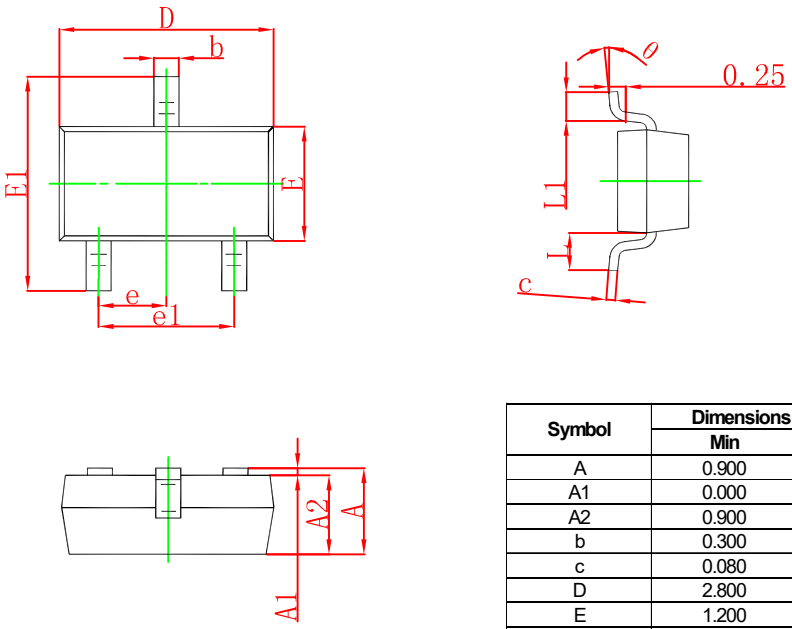


Diode Recovery Test Circuit & Waveforms



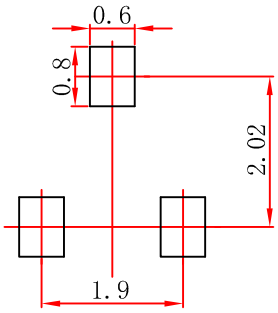


SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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