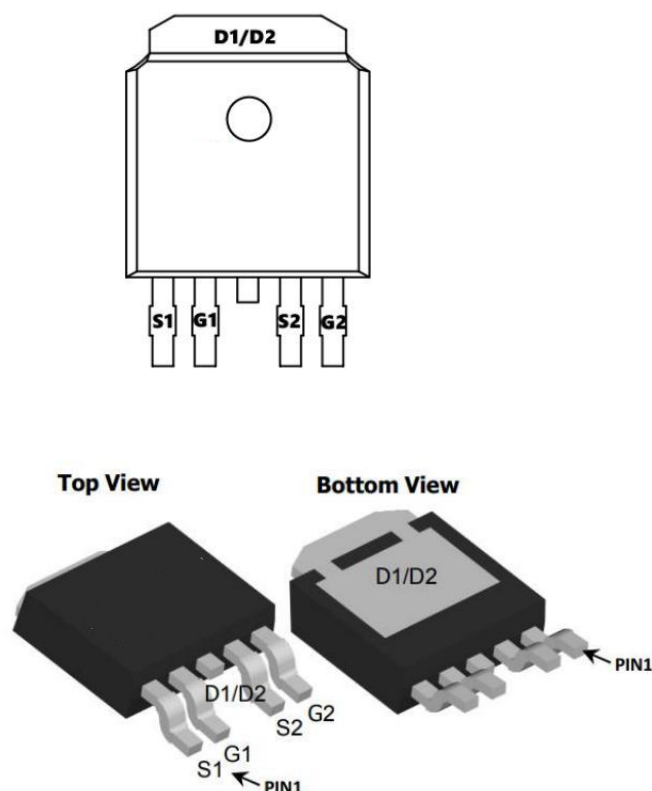


Description

The SX50G03GD 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.



General Features

$V_{DS} = 30V$ $I_D = 52A$

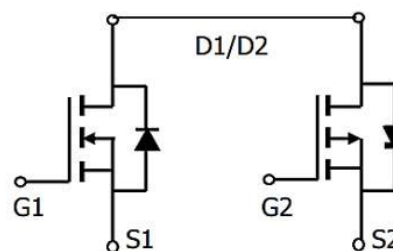
$R_{DS(ON)} < 10m\Omega$ @ $V_{GS}=10V$

$V_{DS} = -30V$ $I_D = -48A$

$R_{DS(ON)} < 13m\Omega$ @ $V_{GS}=-10V$

Application

BLDC



Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	N-Ch	P-Ch	Units
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
$I_D @ T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	52	-48	A
$I_D @ T_c=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	38.5	-37.5	A
I_{DM}	Pulsed Drain Current ²	150	-144	A
EAS	Single Pulse Avalanche Energy ³	289	378	mJ
I_{AS}	Avalanche Current	28	29.5	A
$P_D @ T_c=25^\circ C$	Total Power Dissipation ⁴	46	41.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	62.5		$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	2.3		$^\circ C/W$

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =250uA	30	33	---	V
ΔBVDSS/ΔT _J	BVDSS Temperature Coefficient	Reference to 25°C , I _D =1mA	---	0.0193	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance ²	V _{GS} =10V , I _D =30A	---	7.2	10	mΩ
		V _{GS} =4.5V , I _D =15A	---	11	16	
VGS(th)	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.2	1.6	2.5	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	-3.97	---	mV/°C
IDSS	Drain-Source Leakage Current	V _{DS} =24V , V _{GS} =0V , T _J =25°C	---	---	1	uA
		V _{DS} =24V , V _{GS} =0V , T _J =55°C	---	---	5	
IGSS	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V	---	---	±100	nA
gfs	Forward Transconductance	V _{DS} =5V , I _D =30A	---	34	---	S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	---	1.8	---	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =15V , V _{GS} =4.5V , I _D =15A	---	9.8	---	nC
Q _{gs}	Gate-Source Charge		---	4.2	---	
Q _{gd}	Gate-Drain Charge		---	3.6	---	
Td(on)	Turn-On Delay Time	V _{DD} =15V , V _{GS} =10V , R _G =3.3Ω I _D =15A	---	4	---	ns
T _r	Rise Time		---	8	---	
Td(off)	Turn-Off Delay Time		---	31	---	
T _f	Fall Time		---	4	---	
C _{iss}	Input Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz	---	940	---	pF
C _{oss}	Output Capacitance		---	131	---	
C _{rss}	Reverse Transfer Capacitance		---	109	---	
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V , Force Current	---	---	43	A
ISM	Pulsed Source Current ^{2,5}		---	---	112	A
VSD	Diode Forward Voltage ²	V _{GS} =0V , I _S =1A , T _J =25°C	---	---	1	V
t _{rr}	Reverse Recovery Time	IF=30A , dI/dt=100A/μs , T _J =25°C	---	8.5	---	nS
Q _{rr}	Reverse Recovery Charge		---	2.2	---	nC

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The EAS data shows Max. rating . The test condition is VDD=25V,VGS=10V,L=0.1Mh,IAS=28A
- 4、 The power dissipation is limited by 175°C junction temperature
- 5、 The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-30	-32.5	-	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} = -30V, V _{GS} =0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.2	-1.5	-2.5	V
RDS(on)	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -10A	-	8.8	13	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	16	20	
Rg	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz	4.9	7.0	9.1	Ω
Ciss	Input Capacitance	V _{DS} = -24V, V _{GS} =10V, f=1.0MHz	-	2130	-	pF
Coss	Output Capacitance		-	280	-	pF
Crss	Reverse Transfer Capacitance		-	252	-	pF
Qg	Total Gate Charge	V _{DS} = -24V, I _D = -1A, V _{GS} = -10V	-	22	-	nC
Qgs	Gate-Source Charge		-	4	-	nC
Qgd	Gate-Drain("Miller") Charge		-	5.8	-	nC
td(on)	Turn-on Delay Time	V _{DD} = -24V, I _D = -1A, V _{GS} = -10V, R _{GEN} =7.0Ω	-	9	-	ns
tr	Turn-on Rise Time		-	13	-	ns
td(off)	Turn-off Delay Time		-	48	-	ns
tr	Turn-off Fall Time		-	20	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-29.5	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-44	A
VSD	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -1A	-	-0.74	-1.2	V

Note :

- 1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
- 2、The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3、The power dissipation is limited by 175°C junction temperature
- 4、EAS condition: T_J=25°C , V_{DD}= -24V, V_G= -10V, R_G=7Ω, L=0.1mH, I_{AS}= -29.5A
- 5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

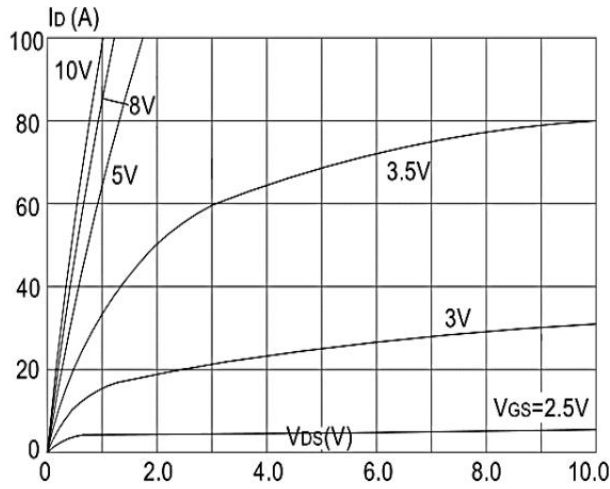


Figure1: Output Characteristics

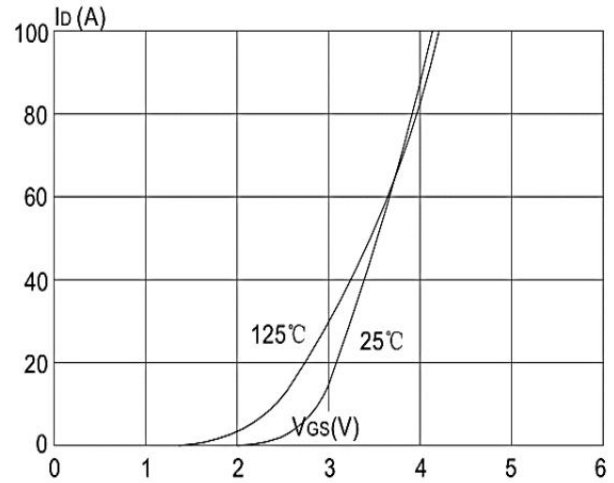


Figure 2: Typical Transfer Characteristics

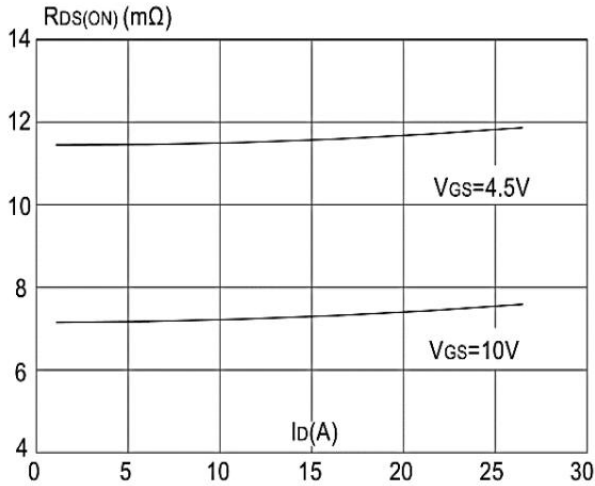


Figure 3: On-resistance vs. Drain Current

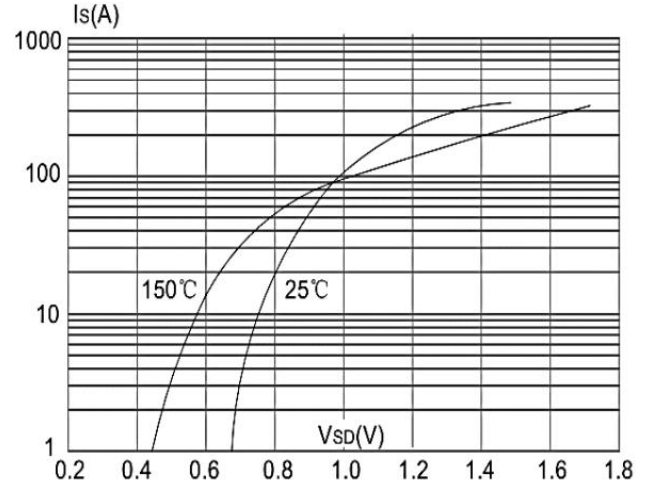


Figure 4: Body Diode Characteristics

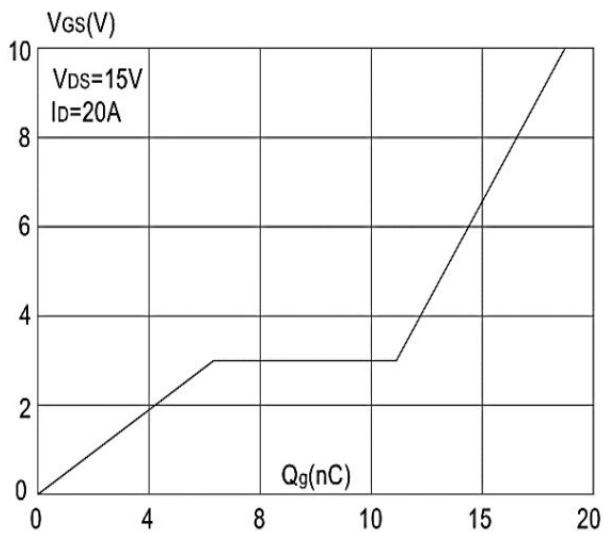


Figure 5: Gate Charge Characteristics

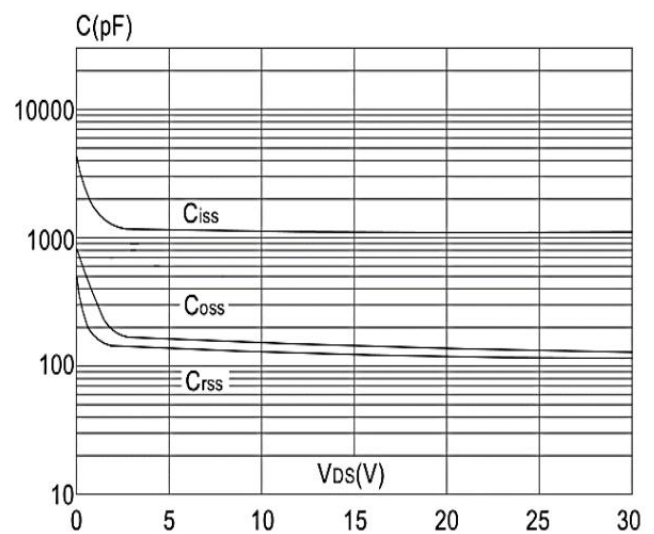


Figure 6: Capacitance Characteristics

N-Typical Characteristics

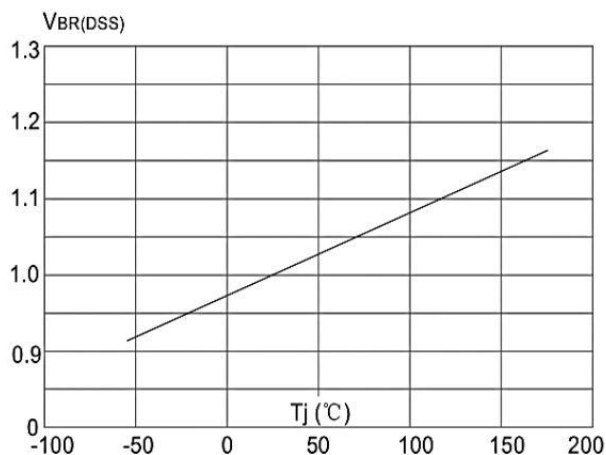


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

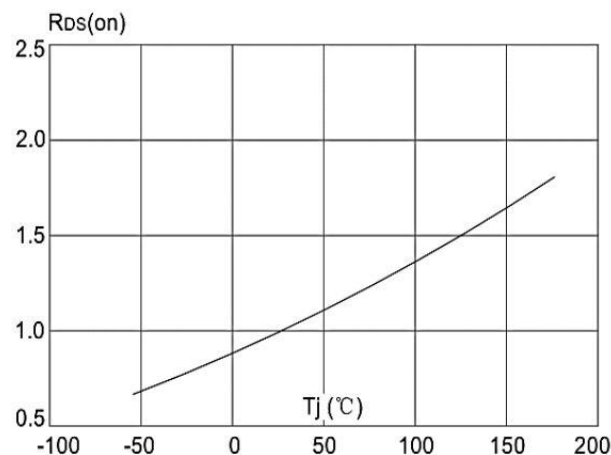


Figure 8: Normalized on Resistance vs. Junction Temperature

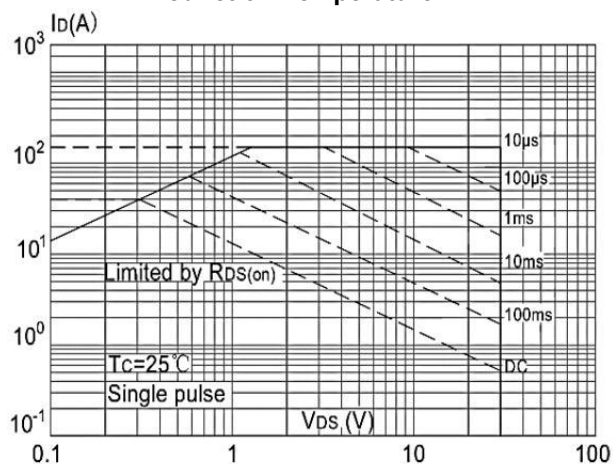


Figure 9: Maximum Safe Operating Area Temperature

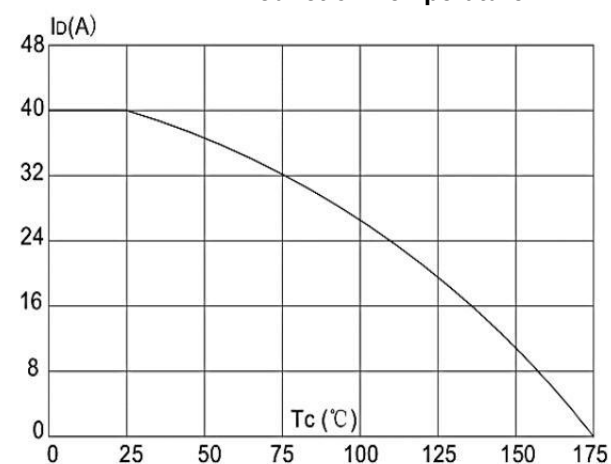


Figure 10: Maximum Continuous Drain Current vs. Ambient

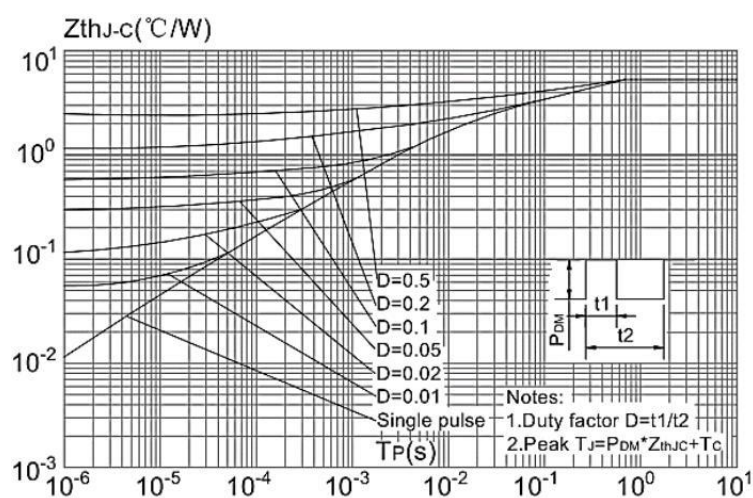


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

P-Typical Characteristics

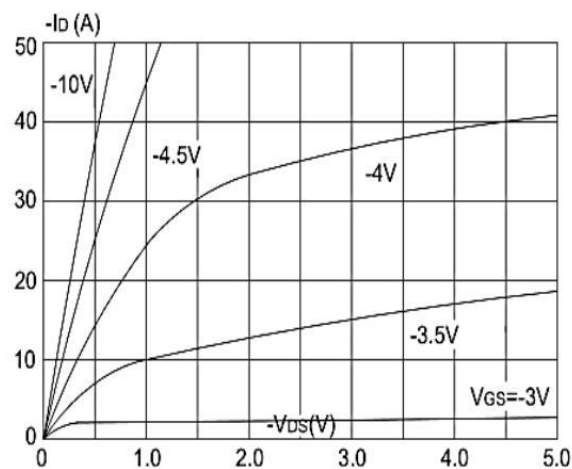


Figure1: Output Characteristics

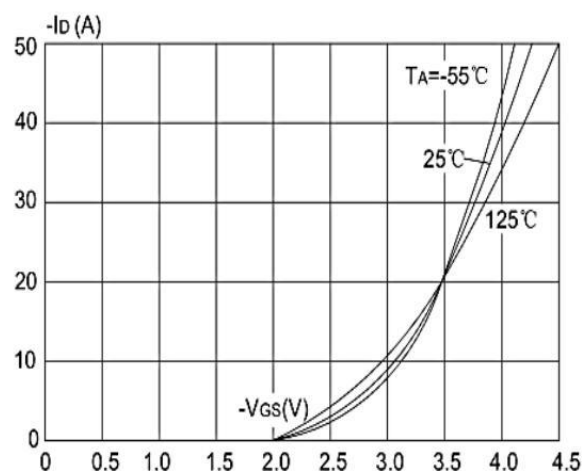


Figure2: Typical Transfer Characteristics

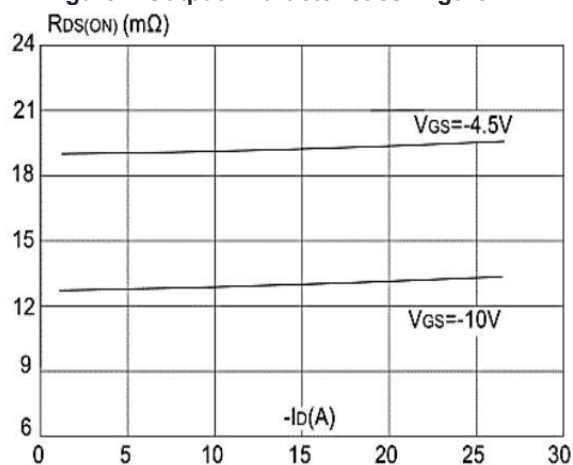


Figure 3: On-resistance vs. Drain Current

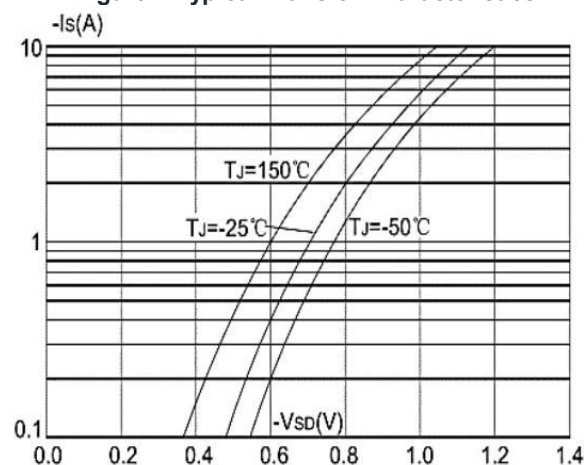


Figure 4: Body Diode Characteristics

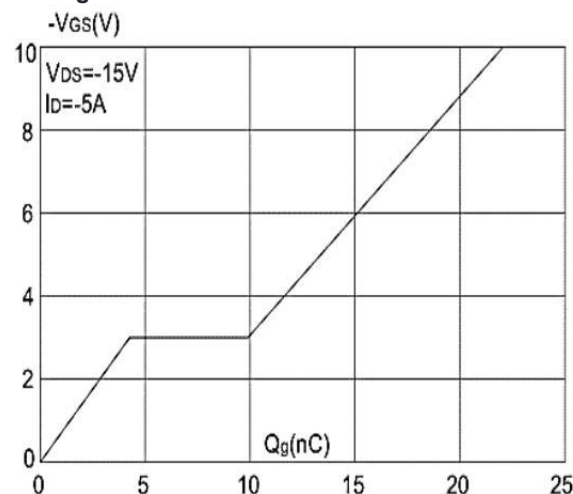


Figure 5: Gate Charge Characteristics

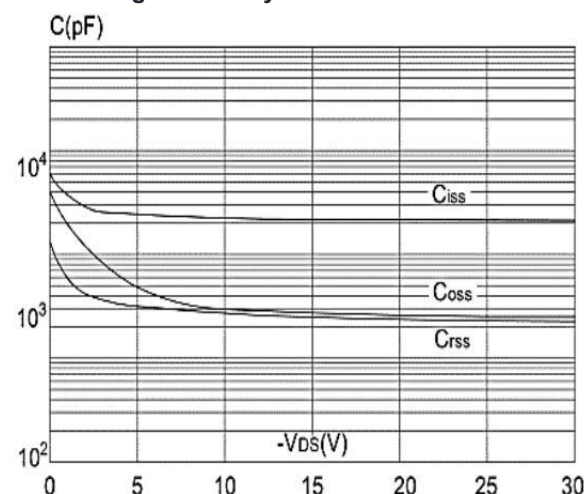


Figure 6: Capacitance Characteristics

P-Typical Characteristics

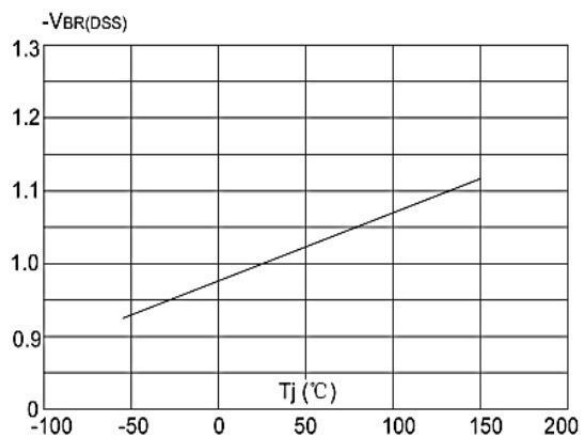


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

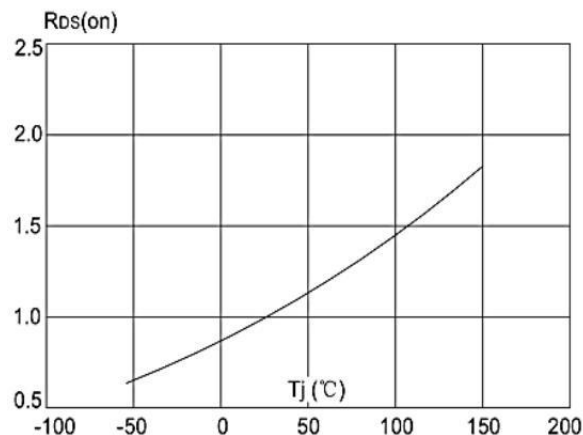


Figure 8: Normalized on Resistance vs. Junction Temperature

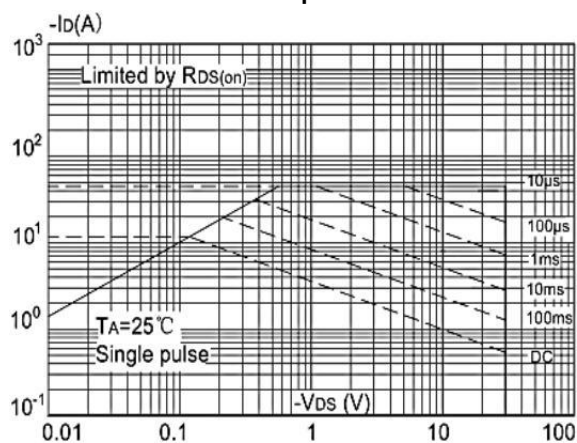


Figure 9: Maximum Safe Operating Area

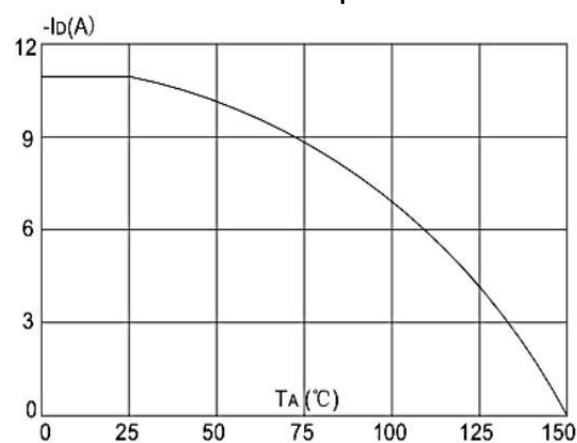


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

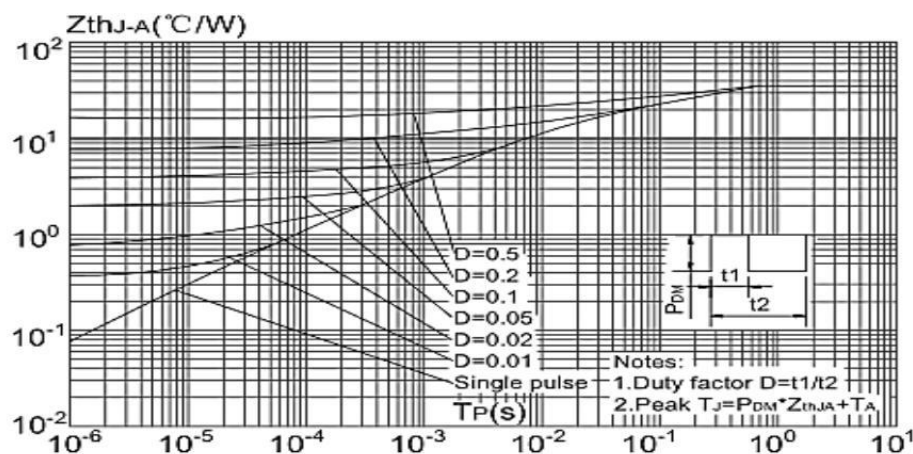
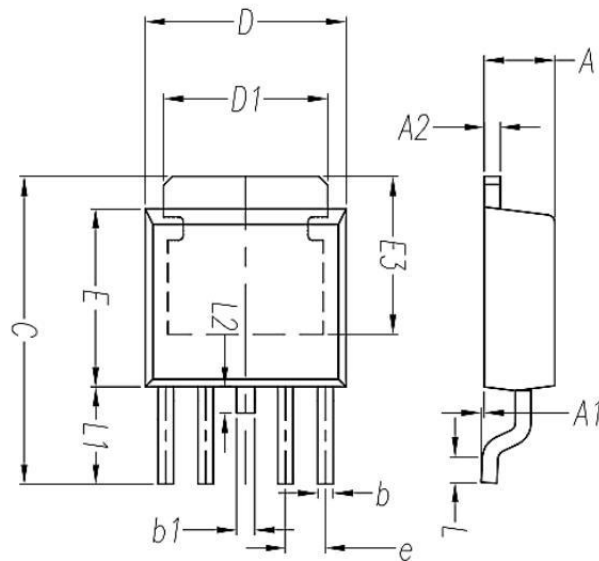


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Package Mechanical Data-TO-252-4L-Duble-DX



Symbol	Common		
	mm		
	Mim	Nom	Max
D	6.30	6.55	6.80
D1	4.80	5.35	5.90
C	9.70	10.00	10.30
E	5.90	6.10	6.30
E3	4.50	5.15	5.80
L	0.90	1.35	1.80
L1	2.60	2.85	3.05
L2	0.50	0.85	1.20
b	0.30	0.50	0.70
b1	0.40	0.60	0.80
A	2.10	2.30	2.50
A2	0.40	0.53	0.65
A1	0.00	0.10	0.20
e	1.17	1.27	1.37

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
TAPING	TO-252-4L		2500