SHANGHAI SINO-IC
MICROELECTRONICS CO., LTD.

June 2007
Revision:A

SED5853B
P-Channel Enhancement Mode Field Effect Transistor with Schottky Diode

General Description

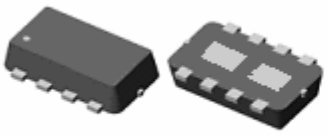
The SED5853 uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. A Schottky diode is provided to facilitate the implementation of a bidirectional blocking switch, or for DC-DC conversion applications. Standard Product SED5853 is Pb-free (meets ROHS specifications).

Features

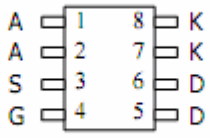
V_{DS}(V) = -20V
I_D = -3.4A (V_{GS} = -4.5V)
$R_{DS(ON)}$< 140mΩ (V_{GS} = -4.5V)
$R_{DS(ON)}$< 200mΩ (V_{GS} = -2.5V)

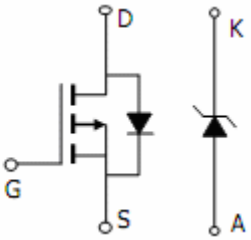
SCHOTTKY

V_{DS}(V)= 20V, I_F= 1A, V_F<0.5V@0.5A



DFN3X2-8L





Absolute maximum ratings (Ta=25℃)

Parameter		Symbol	MOSFET	Schottky	Unit
Drain-Source Voltage		V_{DS}	-20		V
Gate-Source Voltage		V_{GS}	±8		V
Continuous Drain Current [A]	T_A =25℃	I_D	-2.3		A
	T_A =70℃		-1.9		
Pulsed Drain Current [B]		I_{DM}	-15		
Schottky reverse voltage		V_{KA}		20	V
Continuous Forward Current [A]	T_A =25℃	I_F		1.9	A
	T_A =70℃			1.2	
Pulsed Forward Current [B]		I_{FM}		7	
Power Dissipation	T_A =25℃	P_D	1.7	0.96	W
	T_A =70℃		1.1	0.62	
Junction and Storage Temperature Rang		I_J, I_{STG}	-55 to 150	-55 to 150	℃

Parameter: Thermal Characteristics MOSFET		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	51	75	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		88	110	
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	28	35	
Thermal Characteristics Schottky					
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	66	80	℃/W
Maximum Junction-to-Ambient [A]	Steady-State		95	130	
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	40	50	

Electrical Characteristics（TJ＝25℃ unless otherwise note）						
Symbol	**Parameter**	**Conditions**	**Min**	**Typ**	**Max**	**Units**
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D= -250uA,V_{GS}=0V	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}= -16V,V_{GS}=0V			-1	uA
		V_{DS}= -16V,V_{GS}=0V (T_J=55℃)			-5	uA
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±8V			±100	nA
$V_{GS(IN)}$	Gate Threshold Voltage	V_{DS}= $V_{GS,}$ I_D= -250uA	-0.3	-0.63	-1	V
$I_{D(ON)}$	On state drain current	V_{GS}= -4.5V, V_{DS}=-5V	-15			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-4.5V, I_D= -2.0A		120	140	mΩ
		V_{GS}= -2.5V, I_D= -2.0A		180	200	mΩ
g_{FS}	Forward Transconductance	V_{GS}= -5V, I_D= -2.0A	4	7		S
V_{SD}	Diode Forward Voltage	V_{GS}= 0V, I_S= -1A		-0.83	-1	V
I_S	Maximum Body-Diode Continuous Current				-2	A
DYNAMIC PARAMETERS						
C_{ISS}	Input Capacitance	V_{GS}= 0V, V_{DS}= -10V,f= 1MHz		540		pF
C_{OSS}	Output Capacitance			72		pF
C_{RSS}	Reverse Transfer Capacitance			49		pF
R_g	Gate resistance	V_{GS}= 0V, V_{DS}= 0V,f= 1MHz		12		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=-4.5V,V_{DS}=-10V,I_D= -3.4A		6.1		nC
Q_{gs}	Gate Source Charge			0.6		nC
Q_{gd}	Gate Drain Charge			16		nC
$T_{D(on)}$	Turn-On DelayTime	V_{GS}= -4.5V, V_{DS}= -10V, R_L= 2.9Ω, R_{GEN}= 3Ω		10		ns
t_r	Turn-On Rise Time			12		ns
$T_{D(off)}$	Turn-Off DelayTime			44		ns
t_f	Turn-Off Fall Time			22		ns
t_{rr}	Reverse Recovery Time	I_F= -3.4A,dI/dt=100A/us		21		ns
Q_{rr}	Reverse Recovery Charge	I_F= -3.4A,dI/dt=100A/us		7.5		nC
SCHOTTKY PARAMETERS						
V_F	Forward Voltage Drop	I_F= 0.5A		0.39	0.5	V
I_{rm}	Maximum reverse leakage current	V_R=16V			0.05	mA
		V_R= 16V, T_J=125℃			10	
C_T	Junction Capacitance	V_R= 10V		34		pF
t_{rr}	SchottkyReverse Recovery Time	I_F= 1A,dI/dt=100A/us		5.2	10	Ns
Q_{rr}	Schottky Reverse Recovery Charge	I_F= 1A,dI/dt=100A/us		0.8		nC

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

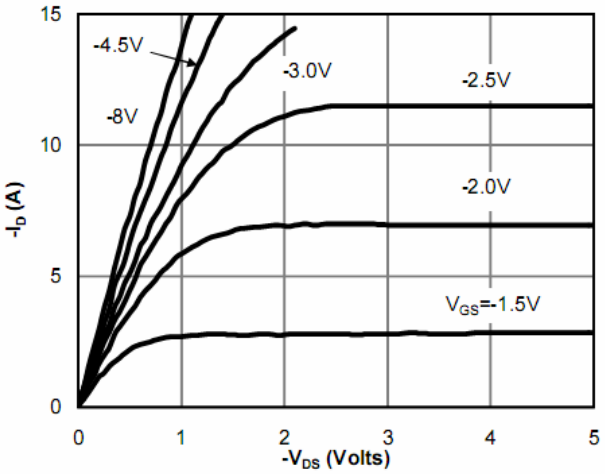


Fig 1: On-Region Characteristics

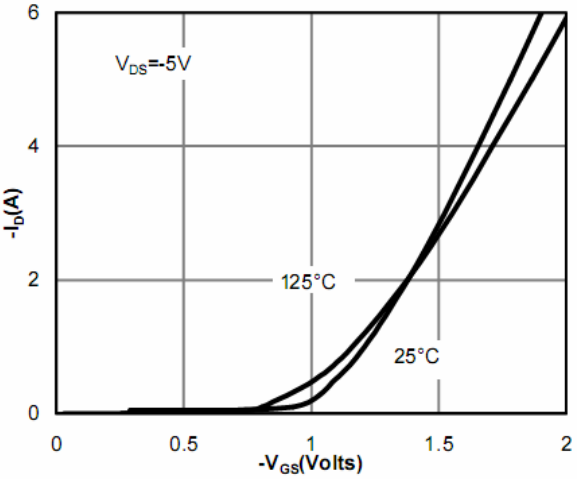


Figure 2: Transfer Characteristics

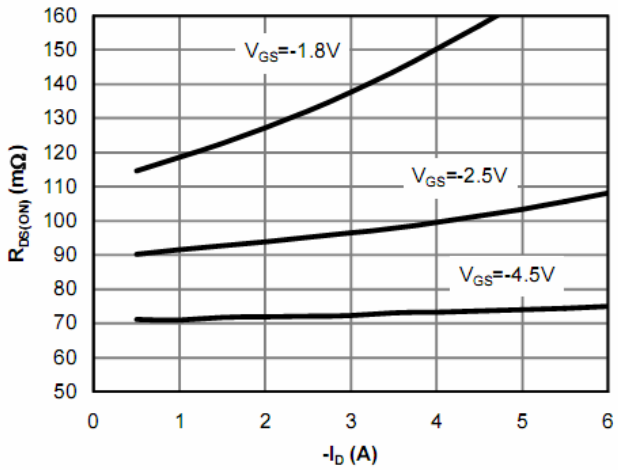


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

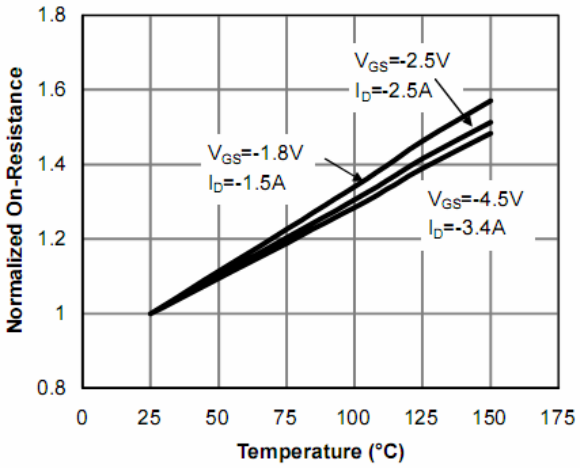


Figure 4: On-Resistance vs. Junction Temperature

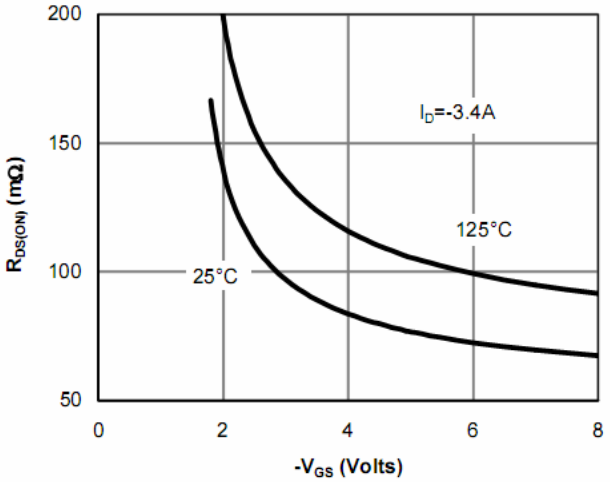


Figure 5: On-Resistance vs. Gate-Source Voltage

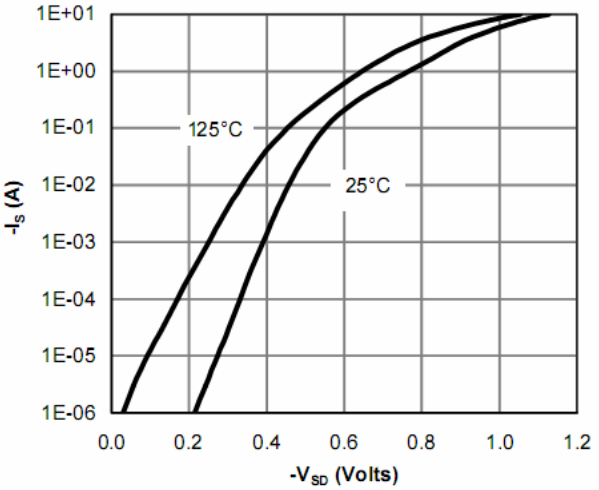


Figure 6: Body-Diode Characteristics

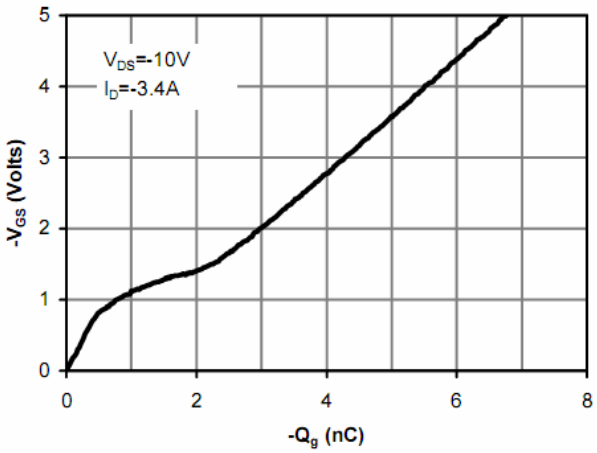


Figure 7: Gate-Charge Characteristics

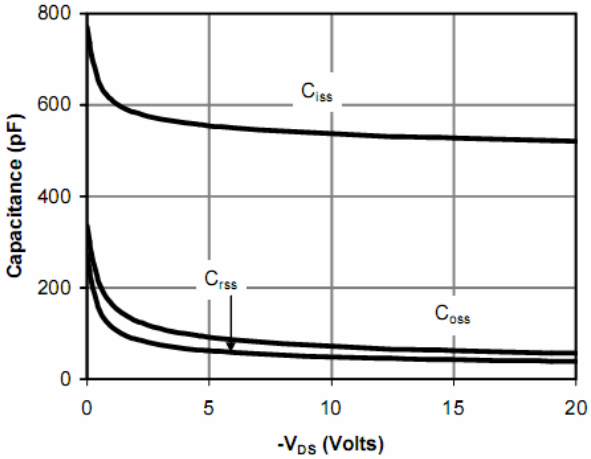


Figure 8: Capacitance Characteristics

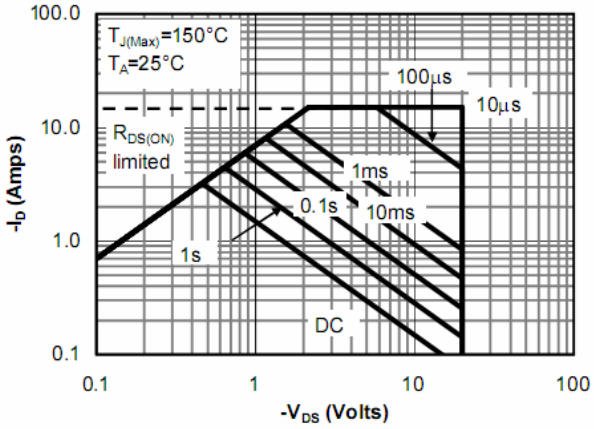


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

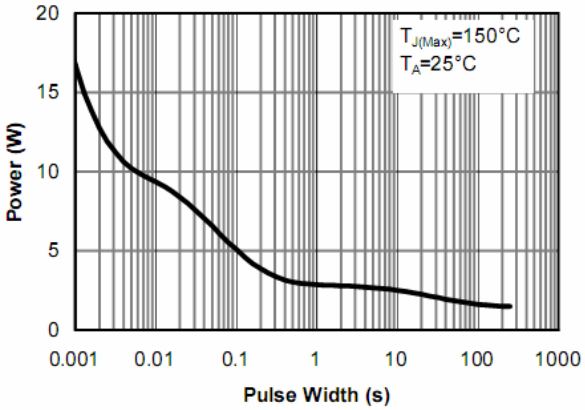


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

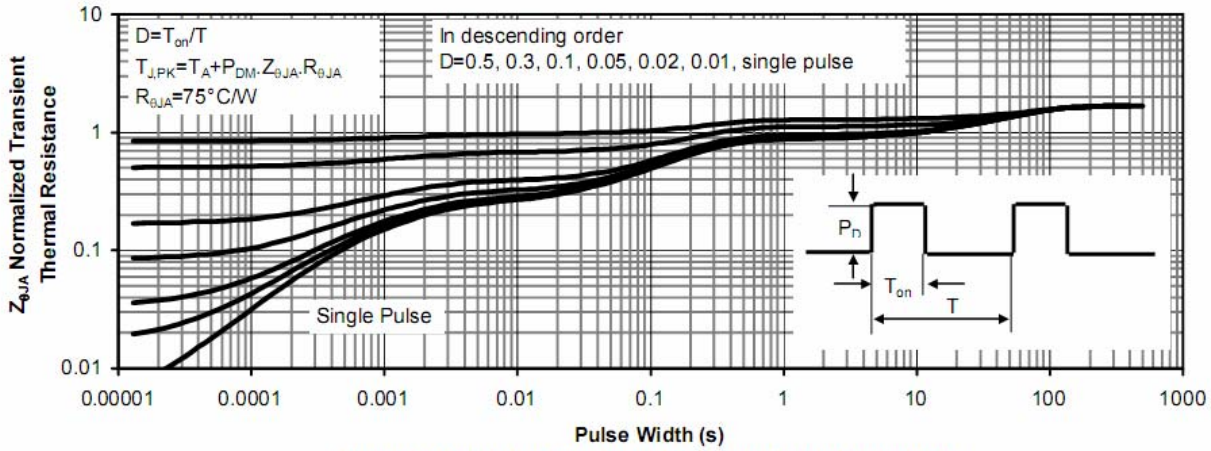


Figure 11: Normalized Maximum Transient Thermal Impedance

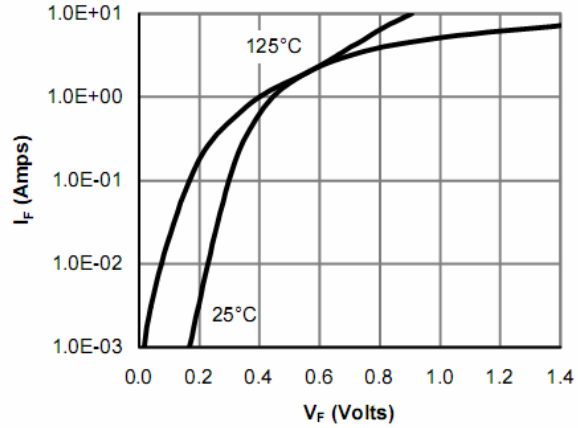


Figure 12: Schottky Forward Characteristics

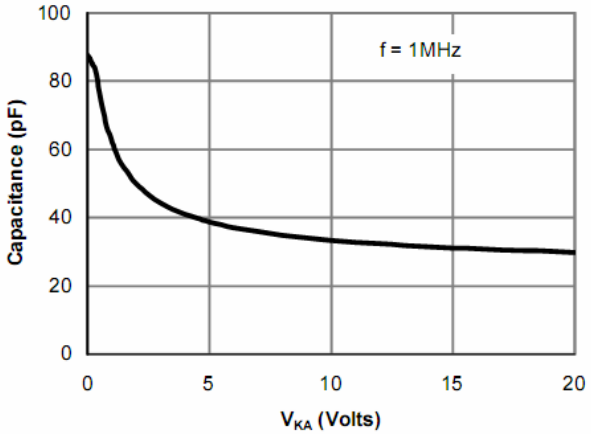


Figure 13: Schottky Capacitance Characteristics

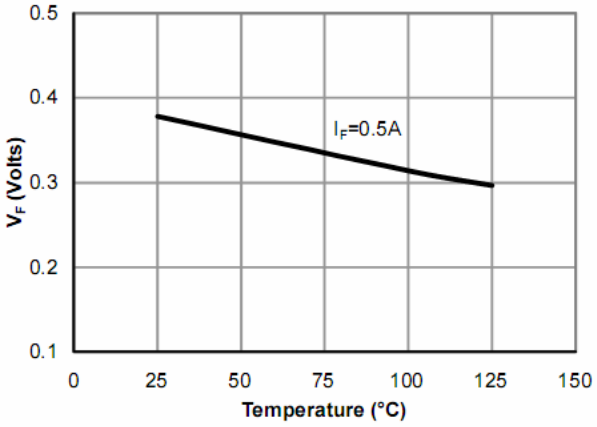


Figure 14: Schottky Forward Drop vs. Junction Temperature

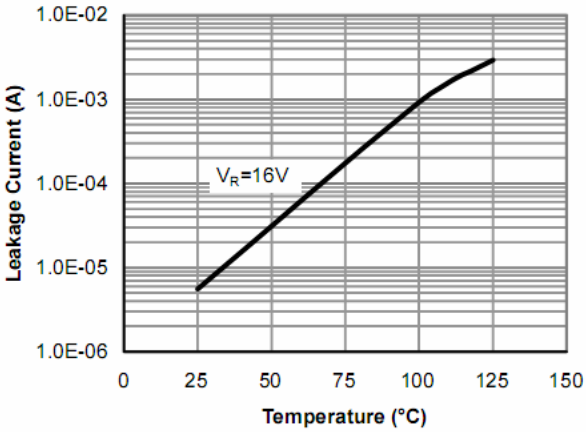


Figure 15: Schottky Leakage current vs. Junction Temperature

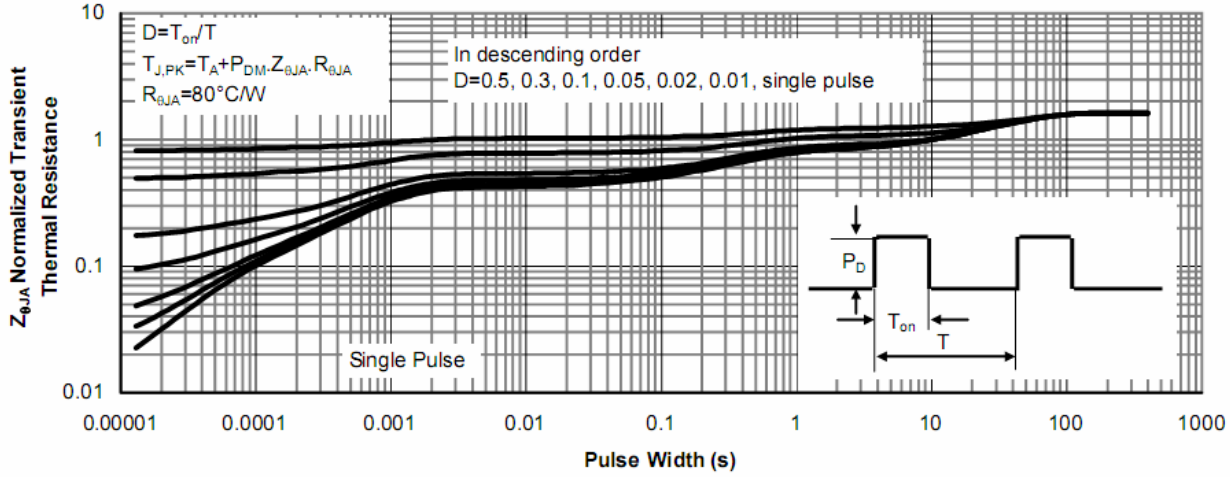


Figure 16: Schottky Normalized Maximum Transient Thermal Impedance

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