



## Description

The HBSD235CH6327 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

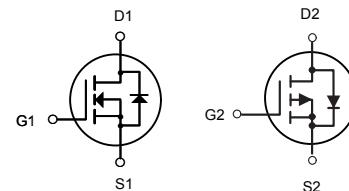
$V_{DS} = 20V$   $I_D = 0.75A$

$R_{DS(ON)} < 380m\Omega$  @  $V_{GS}=4.5V$

$V_{DS} = -20V$   $I_D = -0.66A$

$R_{DS(ON)} < 570m\Omega$  @  $V_{GS}=-4.5V$

**SOT-363  
(SC-70-6)**



## Application

Wireless charging

N-Channel MOSFET

P-Channel MOSFET

Boost driver

Brushless motor

## Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
HBSD235CH6327	SOT-363(SC-70-6)		3000

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

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
$V_{DS}$	Drain-Source Voltage	20	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	$\pm 12$	V
$I_D @ T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	0.75	-0.66	A
$IDM$	Pulsed Drain Current <sup>2</sup>	1.8	-1.2	A
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C
$R_{\theta JA}$	Thermal Resistance Junction-Ambient <sup>1</sup>	833		°C/W



**N-ch MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = 250\mu\text{A}$	20			V
Zero gate voltage drain current	$I_{\text{DSS}}$	$V_{\text{DS}} = 20\text{V}, V_{\text{GS}} = 0\text{V}$			1	$\mu\text{A}$
Gate-body leakage current	$I_{\text{GSS}}$	$V_{\text{GS}} = \pm 10\text{V}, V_{\text{DS}} = 0\text{V}$			$\pm 20$	$\text{uA}$
Gate threshold voltage (note 2)	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = 250\mu\text{A}$	0.35		1.1	V
Drain-source on-resistance(note 2)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = 4.5\text{V}, I_{\text{D}} = 0.65\text{A}$		210	380	$\text{m}\Omega$
		$V_{\text{GS}} = 2.5\text{V}, I_{\text{D}} = 0.55\text{A}$		320	450	$\text{m}\Omega$
		$V_{\text{GS}} = 1.8\text{V}, I_{\text{D}} = 0.45\text{A}$		390	800	$\text{m}\Omega$
Forward transconductance(note 2)	$g_{\text{FS}}$	$V_{\text{DS}} = 10\text{V}, I_{\text{D}} = 0.8\text{A}$		1.6		S
Diode forward voltage	$V_{\text{SD}}$	$I_{\text{S}} = 0.15\text{A}, V_{\text{GS}} = 0\text{V}$			1.2	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}} = 16\text{V}, V_{\text{GS}} = 0\text{V}, f = 1\text{MHz}$		79	120	pF
Output Capacitance	$C_{\text{oss}}$			13	20	pF
Reverse Transfer Capacitance	$C_{\text{rss}}$			9	15	pF
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = 4.5\text{V}, V_{\text{DS}} = 10\text{V}, I_{\text{D}} = 500\text{mA}, R_{\text{GEN}} = 10\Omega$		6.7		ns
Turn-on rise time	$t_{\text{r}}$			4.8		ns
Turn-off delay time	$t_{\text{d}(\text{off})}$			17.3		ns
Turn-off fall time	$t_{\text{f}}$			7.4		ns

**P-ch MOSFET ELECTRICAL CHARACTERISTICS( $T_a=25^\circ\text{C}$  unless otherwise noted)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
<b>STATIC CHARACTERISTICS</b>						
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_{\text{D}} = -250\mu\text{A}$	-20			V
Zero gate voltage drain current	$I_{\text{DSS}}$	$V_{\text{DS}} = -20\text{V}, V_{\text{GS}} = 0\text{V}$			-1	$\mu\text{A}$
Gate-body leakage current	$I_{\text{GSS}}$	$V_{\text{GS}} = \pm 10\text{V}, V_{\text{DS}} = 0\text{V}$			$\pm 20$	$\text{uA}$
Gate threshold voltage (note 2)	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_{\text{D}} = -250\mu\text{A}$	-0.35		-1.1	V
Drain-source on-resistance(note 2)	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5\text{V}, I_{\text{D}} = -1\text{A}$		430	570	$\text{m}\Omega$
		$V_{\text{GS}} = -2.5\text{V}, I_{\text{D}} = -0.8\text{A}$		624	700	$\text{m}\Omega$
		$V_{\text{GS}} = -1.8\text{V}, I_{\text{D}} = -0.5\text{A}$		950		$\text{m}\Omega$
Forward transconductance(note 2)	$g_{\text{FS}}$	$V_{\text{DS}} = -10\text{V}, I_{\text{D}} = -0.54\text{A}$		1.2		S
Diode forward voltage	$V_{\text{SD}}$	$I_{\text{S}} = -0.5\text{A}, V_{\text{GS}} = 0\text{V}$			-1.2	V
<b>DYNAMIC CHARACTERISTICS (note 4)</b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{DS}} = -16\text{V}, V_{\text{GS}} = 0\text{V}, f = 1\text{MHz}$		113	170	pF
Output Capacitance	$C_{\text{oss}}$			15	25	pF
Reverse Transfer Capacitance	$C_{\text{rss}}$			9	15	pF
<b>SWITCHING CHARACTERISTICS (note 3,4)</b>						
Turn-on delay time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = -4.5\text{V}, V_{\text{DS}} = -10\text{V}, I_{\text{D}} = -200\text{mA}, R_{\text{GEN}} = 10\Omega$		9		ns
Turn-on rise time	$t_{\text{r}}$			5.8		ns
Turn-off delay time	$t_{\text{d}(\text{off})}$			32.7		ns
Turn-off fall time	$t_{\text{f}}$			20.3		ns

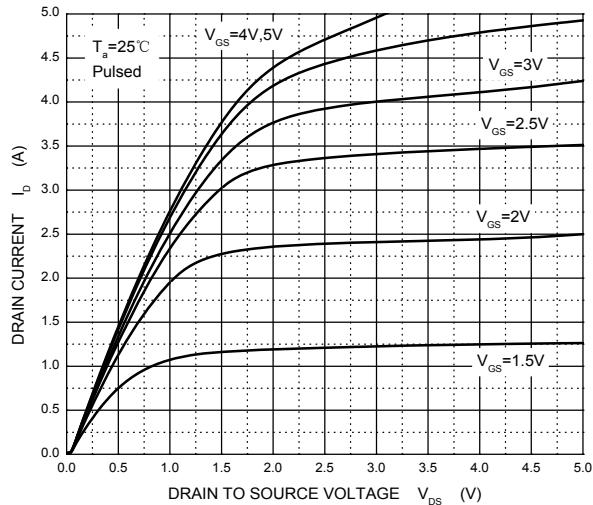
**Notes :**

1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse Test : Pulse width=300 $\mu\text{s}$ , duty cycle $\leq 2\%$ .
3. Switching characteristics are independent of operating junction temperature.
4. Guaranteed by design, not subject to producting.

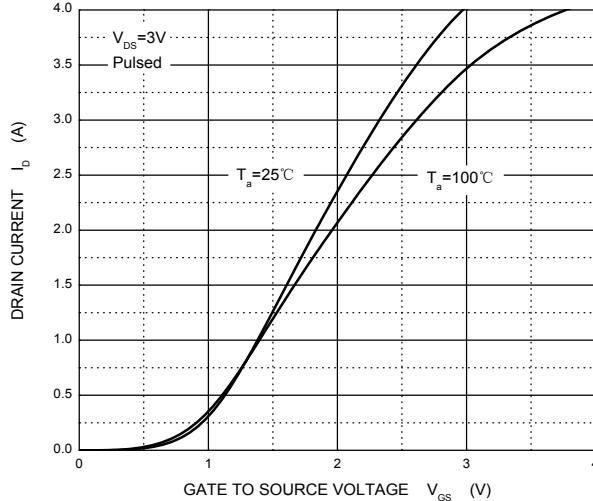


## N-Channel Typical Characteristics

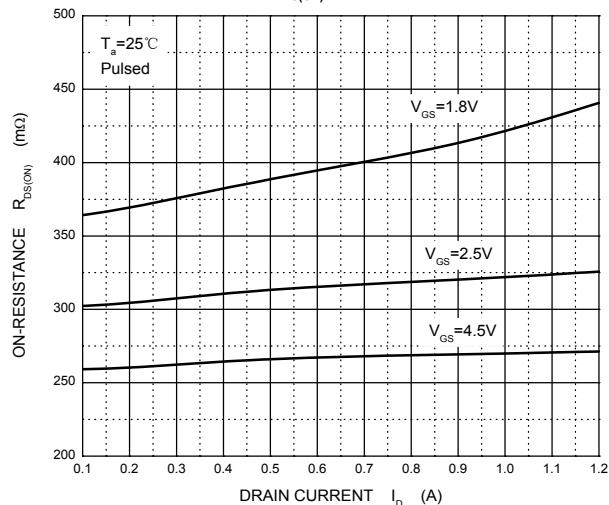
Output Characteristics



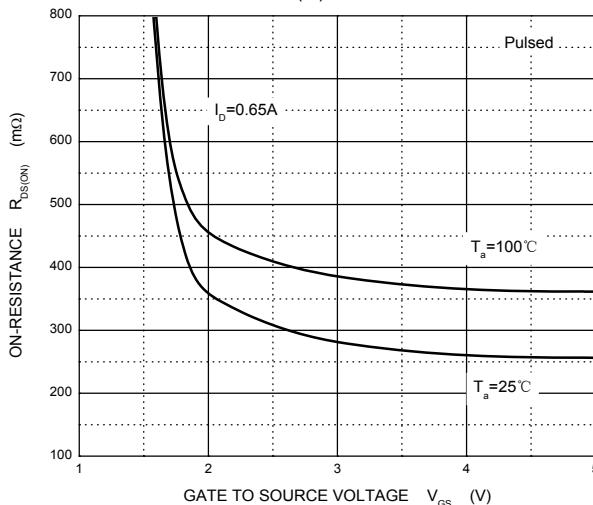
Transfer Characteristics



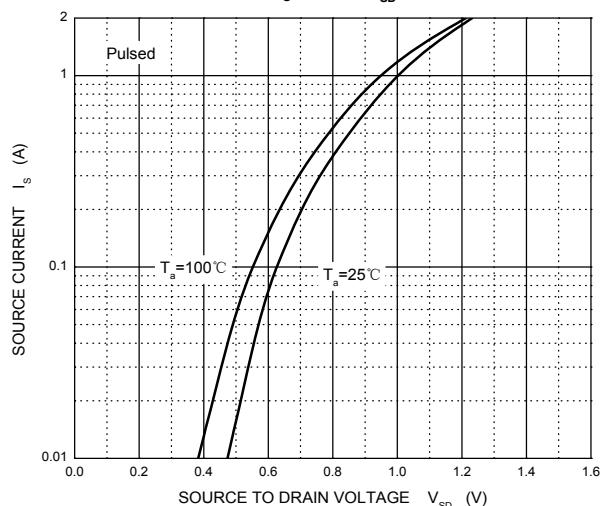
$R_{DS(ON)}$  —  $I_D$



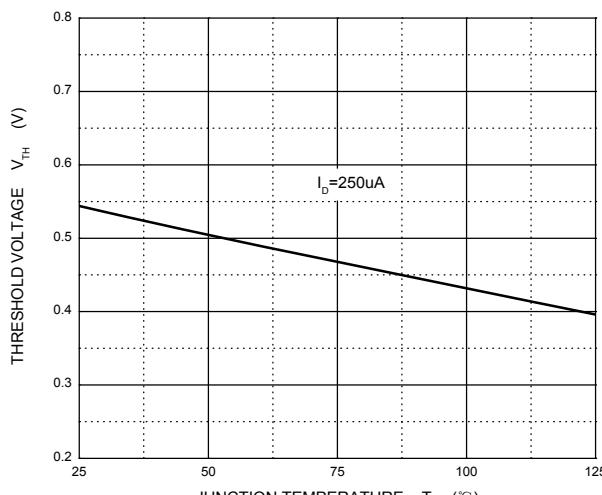
$R_{DS(ON)}$  —  $V_{GS}$



$I_s$  —  $V_{SD}$



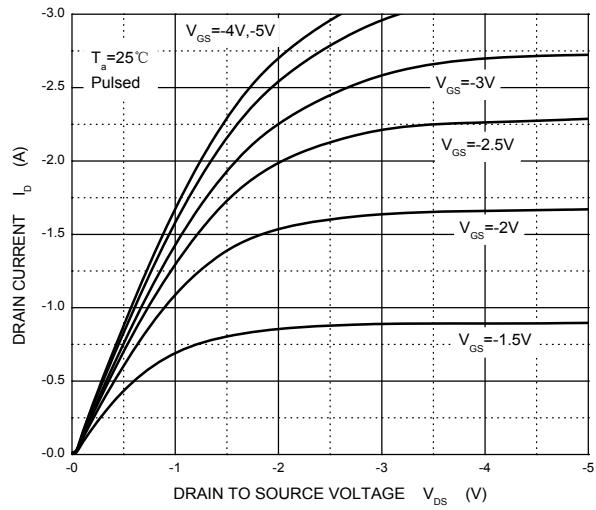
Threshold Voltage



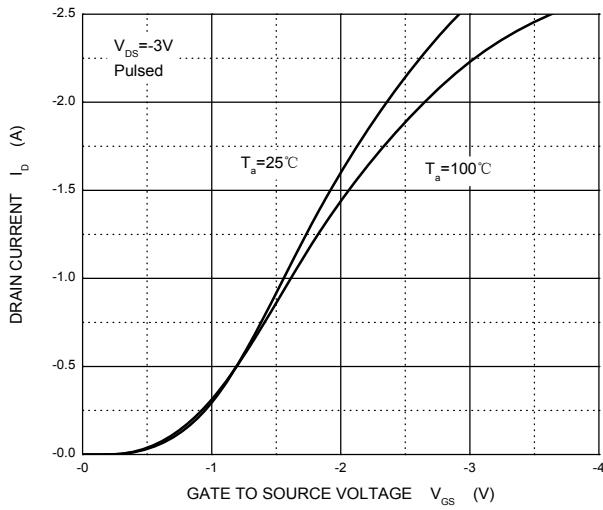


## P-Channel Typical Characteristics

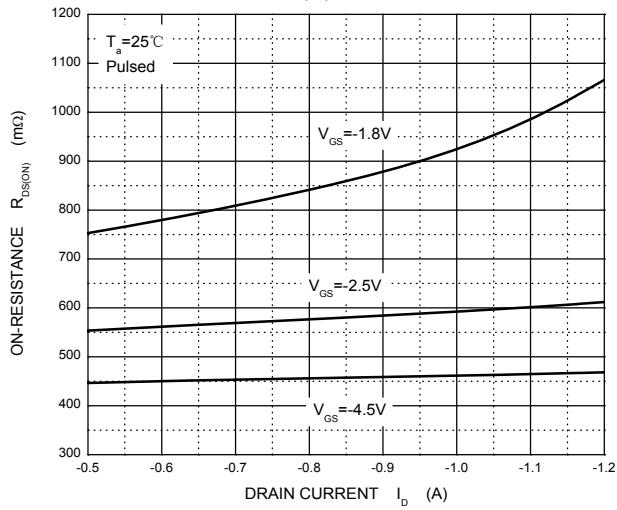
Output Characteristics



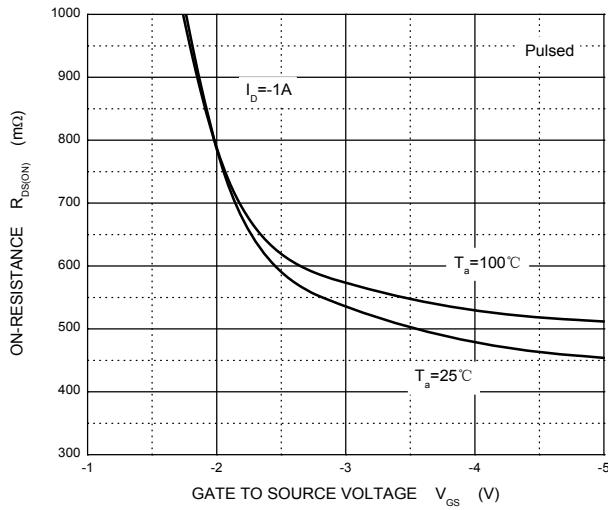
Transfer Characteristics



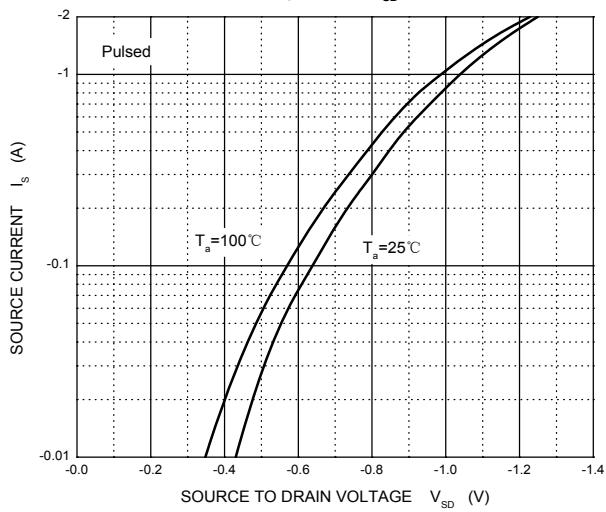
$R_{DS(ON)}$  —  $I_D$



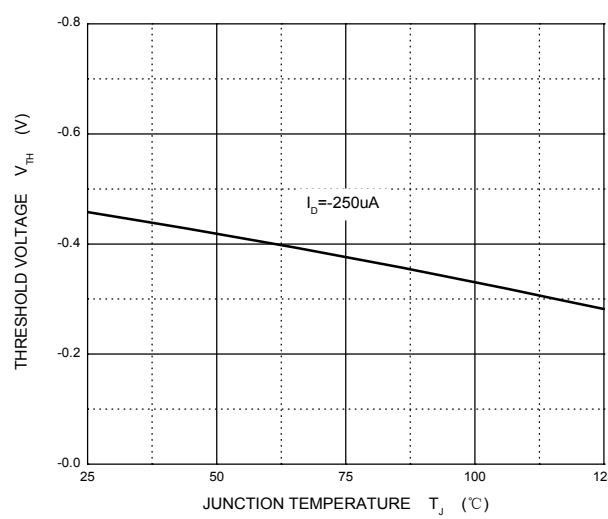
$R_{DS(ON)}$  —  $V_{GS}$



$I_s$  —  $V_{SD}$

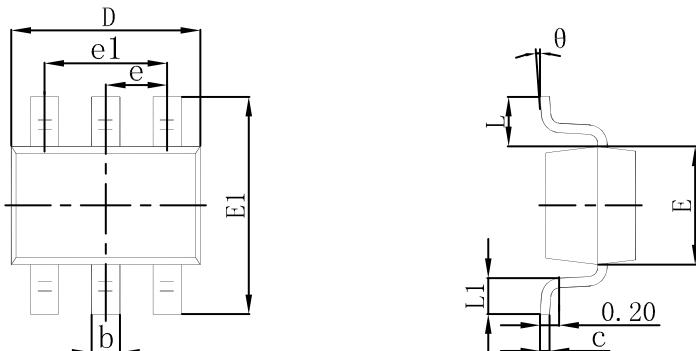


Threshold Voltage



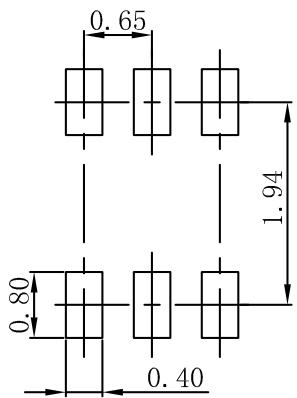


### SOT-363(SC-70-6) Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014
c	0.100	0.150	0.004	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.400	0.085	0.094
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

### SOT-363(SC-70-6) Suggested Pad Layout



#### Note:

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



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