

## 40V 2.0mohm N-channel SGT MOSFET

### Description:

This N-channel SGT MOSFET has been designed to low on-state resistance and maintain superior switching performance, especial for high efficiency power management applications.

### Features:

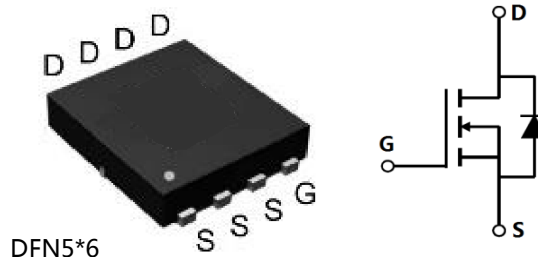
- Low  $R_{DS(ON)}$
- RoHS compliant <sup>(Note 1)</sup>
- Halogen-free <sup>(Note 1)</sup>
- 100% UIS Tested

### Applications:

- Battery Management System
- Motor Drivers
- DC-DC Converter

### Key Performance Parameters:

Parameter	Value	Unit
$V_{DS}$	40	V
$R_{DS(ON), max} @ V_{GS} = 10V$	2.0	m $\Omega$
$I_D$	200	A



### Ordering Information:

Ordering Code	Package Type	Marking Code	Form	Packing
MPGJ04R017	DFN5*6	MPGJ04R017	-	-

### Notes:

1. Contact MP sales for detail information

## Maximum Ratings ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
$V_{DS}$	Drain-Source Voltage	40	V
$I_D$	Drain Current - Continuous ( $T_C = 25^\circ\text{C}$ ) <sup>(Note 1)</sup>	200	A
	Drain Current - Continuous ( $T_C = 100^\circ\text{C}$ )	125	A
$I_{DM}$	Drain Current - Pulsed <sup>(Note 2)</sup>	600	A
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$E_{AS}$	Single Pulsed Avalanche Energy <sup>(Note 3)</sup>	552	mJ
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	130	W
$T_J, T_{STG}$	Operating and Storage Temperature Range	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics

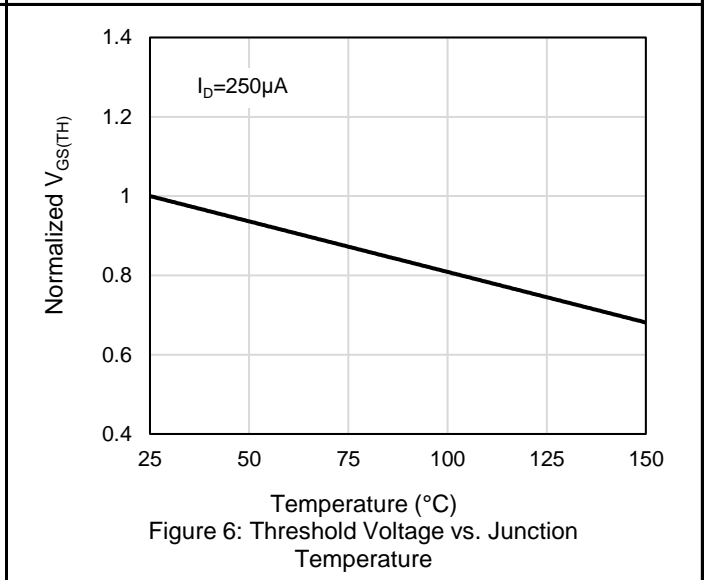
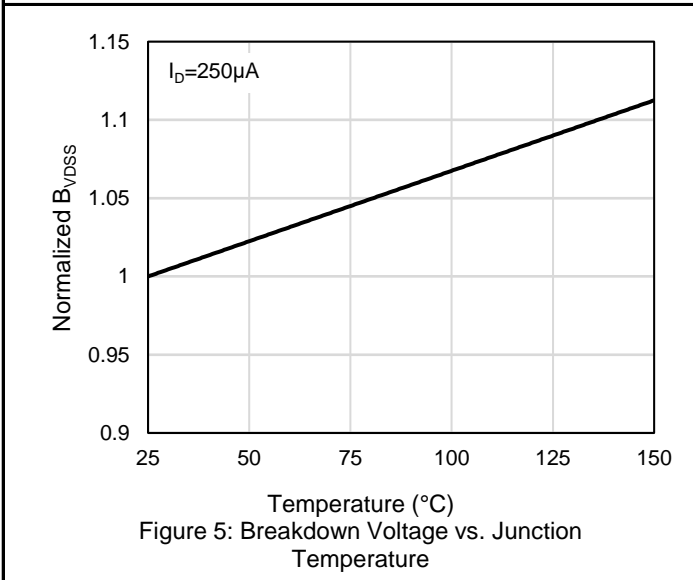
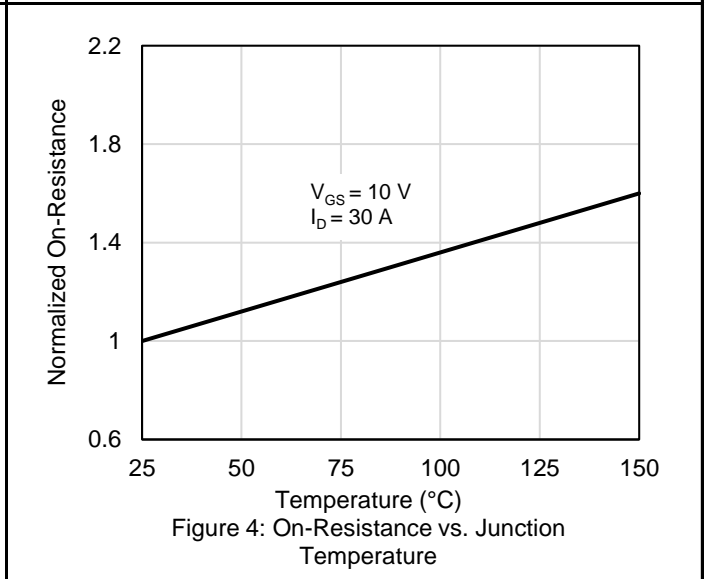
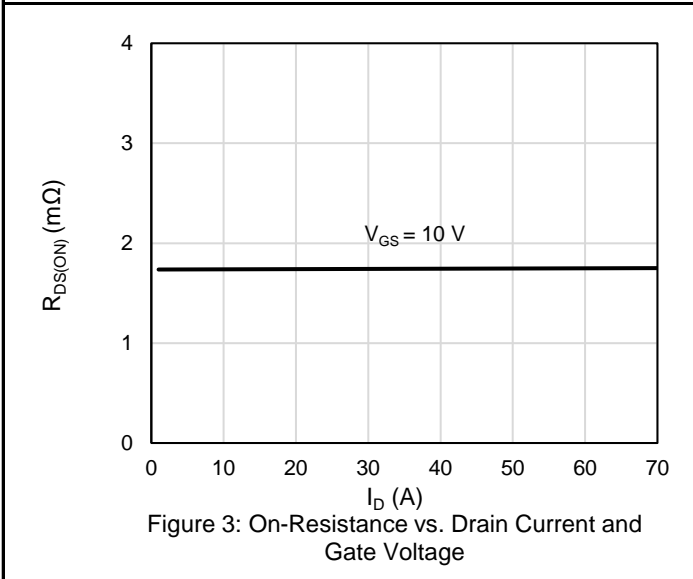
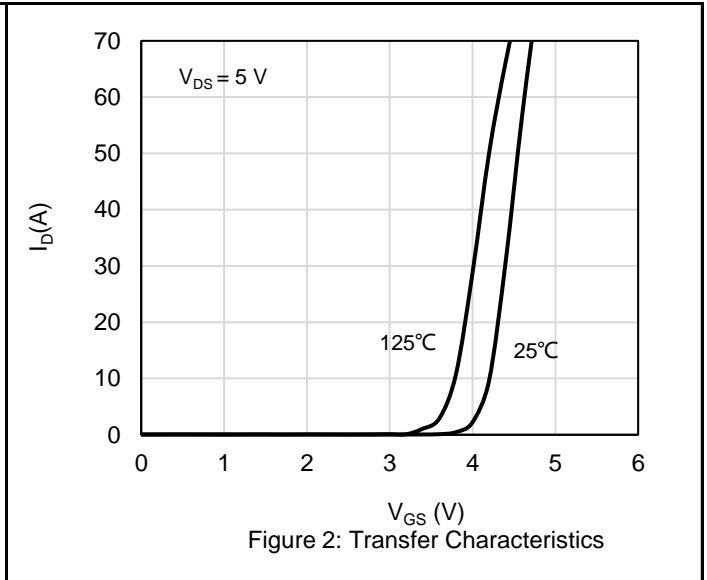
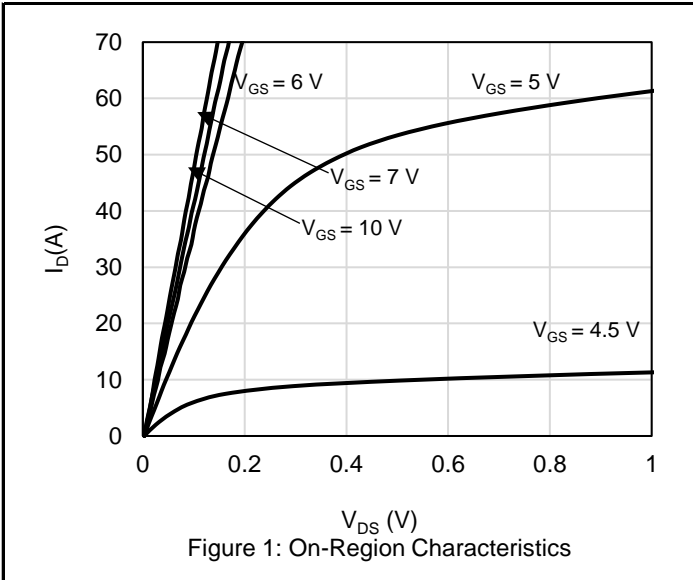
Symbol	Parameter	Value	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Steady-State	1.04	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Steady State <sup>(Note 4)</sup>	62	$^\circ\text{C}/\text{W}$

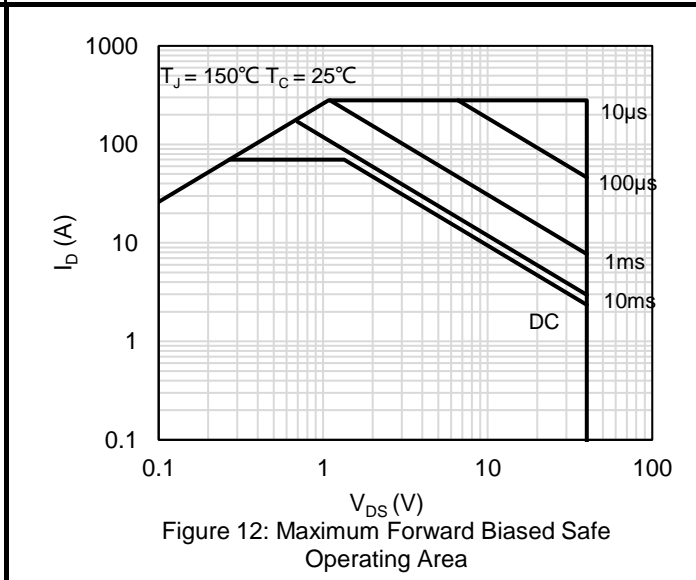
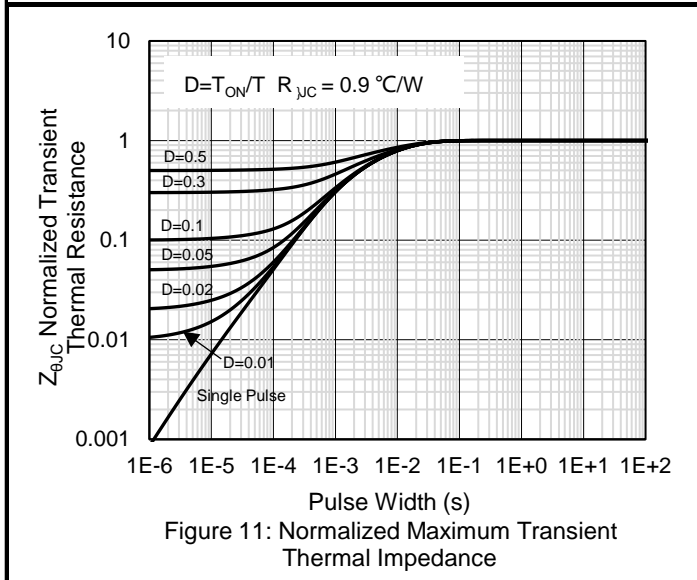
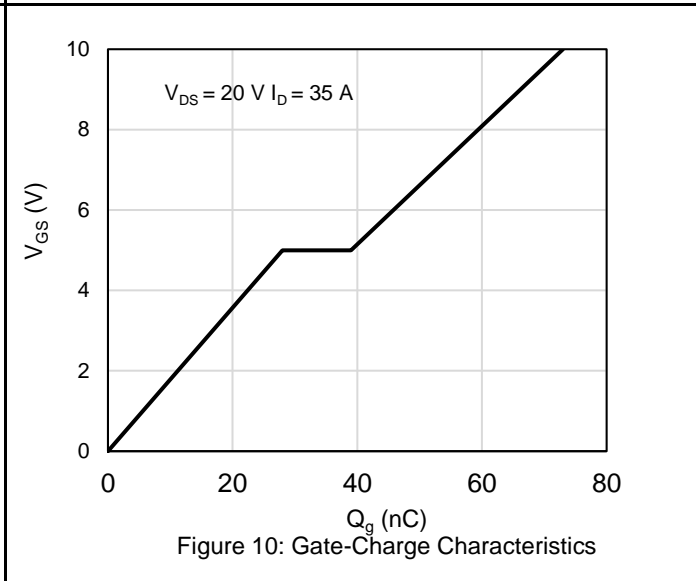
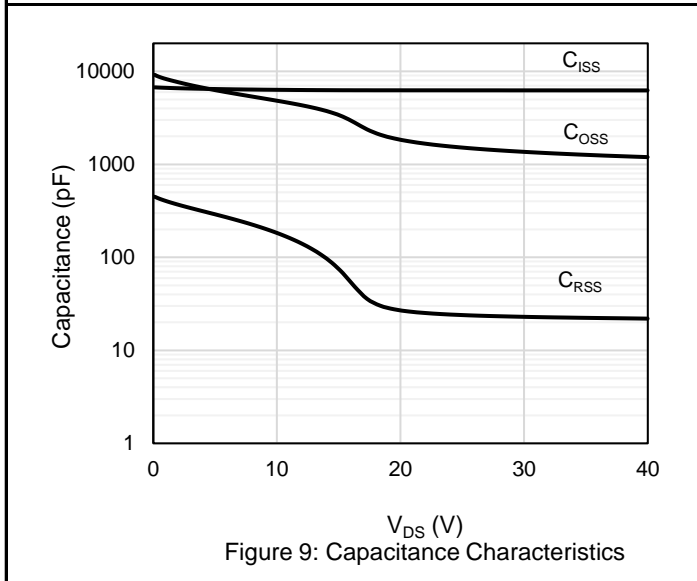
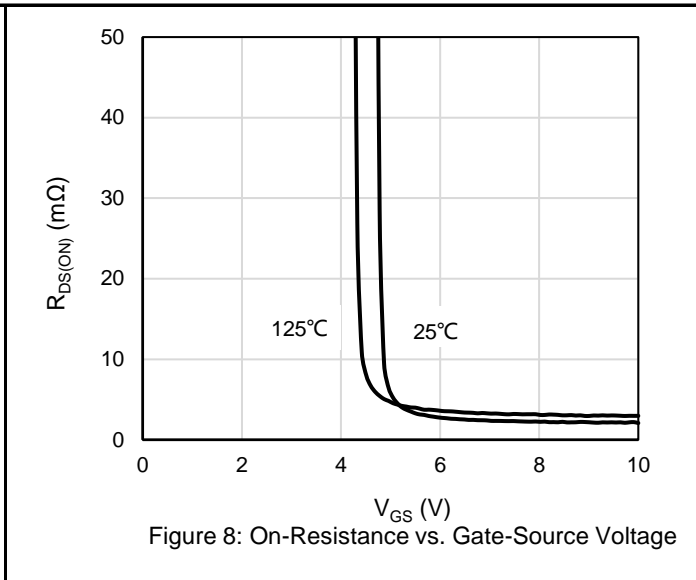
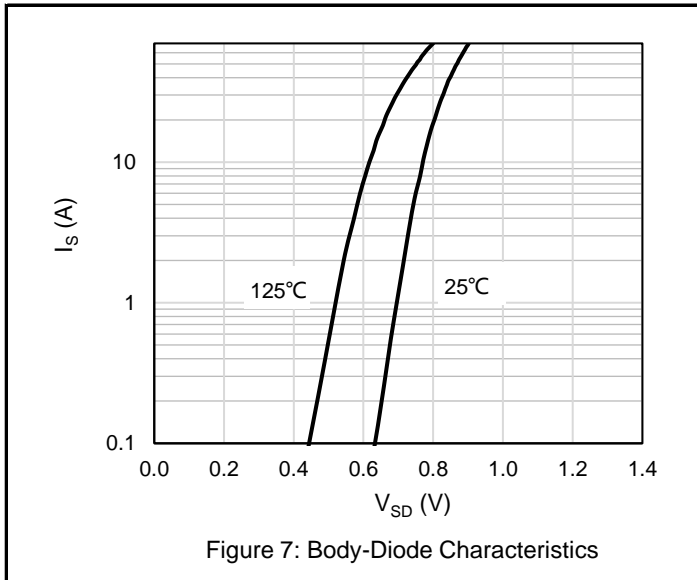
### Notes:

1. The max drain current rating is silicon limited
2. Repetitive Rating: Pulse width limited by maximum junction temperature
3.  $L = 0.5 \text{ mH}$ ,  $V_{DD} = 30 \text{ V}$ ,  $I_{AS} = 47 \text{ A}$ ,  $R_G = 25 \Omega$ , Starting  $T_J = 25 \text{ }^\circ\text{C}$
4. Mount on minimum PCB layout

Electrical Characteristics (T <sub>J</sub> = 25°C unless otherwise noted)						
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
<b>Static Characteristics</b>						
B <sub>V</sub> DSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 0 V,			1	μA
I <sub>GSS</sub>	Gate Leakage Current	V <sub>GS</sub> = ± 20 V, V <sub>DS</sub> = 0 V			±100	nA
V <sub>GS(TH)</sub>	Gate Threshold voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	2	3	4	V
R <sub>DS(ON)</sub>	Drain-Source on-state resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A		1.7	2.0	mΩ
		V <sub>GS</sub> = 6 V, I <sub>D</sub> = 50 A		2.5	3.0	mΩ
<b>Dynamic Characteristics</b>						
C <sub>ISS</sub>	Input Capacitance	V <sub>DS</sub> = 25 V, V <sub>GS</sub> = 0 V, F = 1 MHz		6240		pF
C <sub>OSS</sub>	Output Capacitance			1520		pF
C <sub>RSS</sub>	Reverse Transfer Capacitance			24		pF
R <sub>G</sub>	Gate Resistance	F = 1 MHz		4.2		Ω
<b>Switching Characteristics</b>						
T <sub>D(ON)</sub>	Turn On Delay Time	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 35 A, V <sub>GS</sub> = 10 V, R <sub>G</sub> = 2.0 Ω		13.6		nS
T <sub>R</sub>	Rise Time			10.2		nS
T <sub>D(OFF)</sub>	Turn Off Delay Time			51.6		nS
T <sub>F</sub>	Fall Time			22.2		nS
Q <sub>G</sub>	Total Gate Charge	V <sub>DD</sub> = 20 V, I <sub>D</sub> = 35 A, V <sub>GS</sub> = 10 V		73		nC
Q <sub>GS</sub>	Gate-Source Charge			28		nC
Q <sub>GD</sub>	Gate-Drain Charge			11		nC
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
I <sub>S</sub>	Maximum Continuous Body-Diode Forward Current			200		A
I <sub>SM</sub>	Maximum Pulsed Body-Diode Forward Current <sup>(NOTE 1)</sup>			600		A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 35 A			1.3	V
T <sub>RR</sub>	Reverse recovery time	V <sub>DD</sub> = 35 V, I <sub>D</sub> = 35 A, di/dt = 100 A/μS		76		ns
Q <sub>RR</sub>	Reverse recovery charge			125.4		nC
I <sub>RRM</sub>	Peak Reverse Recovery Current			2.8		A

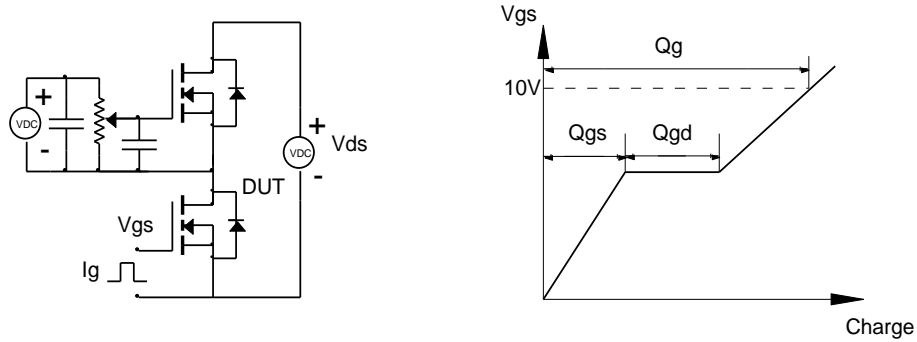
# Electrical Characteristics Diagrams



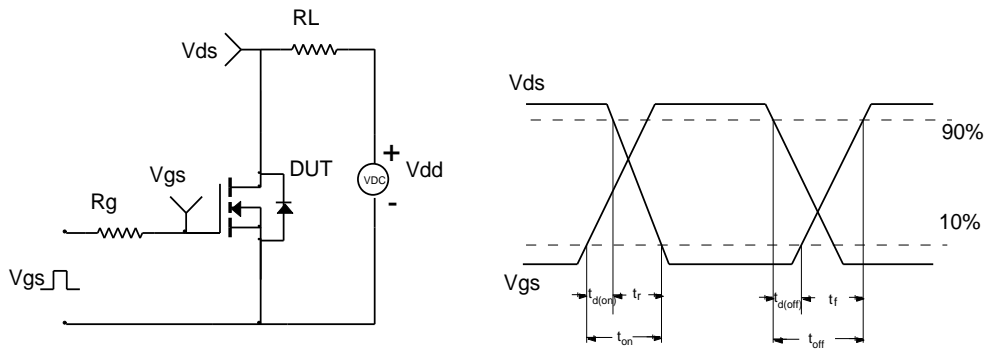


# Test Circuit and Waveform

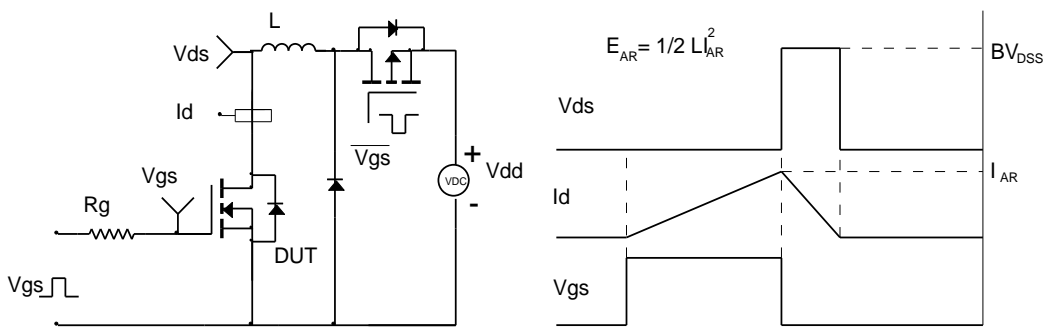
Gate Charge Test Circuit & Waveform



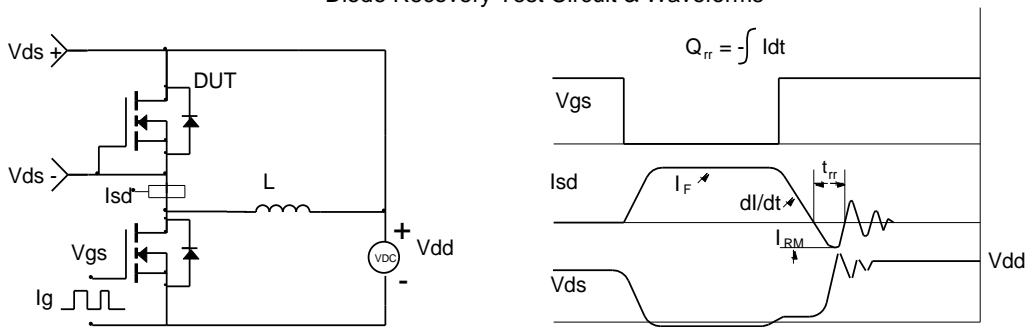
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



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## Package Outlines

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**Revision History**

Revision	Release Date	Remark
Rev.1.0	2022/10/13	Initial Release