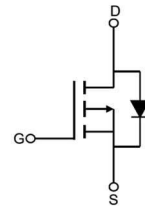


# AP4407

## P-Channel Enhancement Mosfet

### Feature

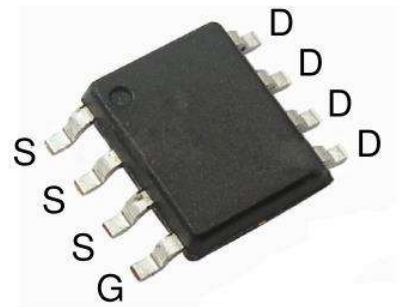
- -30V,-12A  
 $R_{DS(ON)} < 14m\Omega @ V_{GS} = -10V$  TYP:8.5 m $\Omega$   
 $R_{DS(ON)} < 19m\Omega @ V_{GS} = -4.5V$  TYP:13 m $\Omega$
- Trench DMOS Power MOSFET
- Fast Switching
- Exceptional on-resistance and maximum DC current capability



Schematic diagram

### Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch



SOP-8

### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity (PCS)
4407	AP4407	SOP-8	13 inch	-	4000

### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_a=25^{\circ}C$ )	$I_D$	-12	A
Continuous Drain Current ( $T_a=100^{\circ}C$ )	$I_D$	-8.4	A
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	-50	A
Single Pulsed Avalanche Energy <sup>(4)</sup>	$E_{AS}$	78.8	mJ
Power Dissipation	$P_D$	3.7	W
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	42.8	$^{\circ}C/W$
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55~ +150	$^{\circ}C$

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

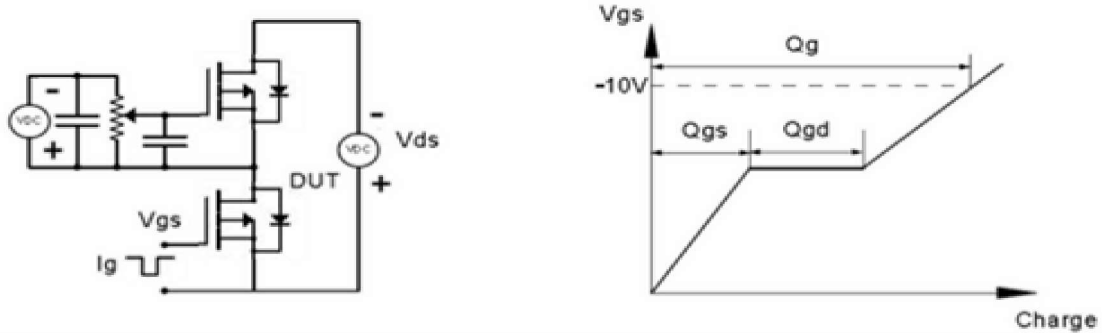
Parameter	Symbol	Test Condition	Min	Type	Max	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -250\mu A$	-30	-	-	V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	-	-	-1	$\mu A$
Gate-body leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate threshold voltage <sup>(2)</sup>	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1	-1.5	-2.5	V
Drain-source on-resistance <sup>(2)</sup>	$R_{DS(on)}$	$V_{GS} = -10V, I_D = -10A$	-	8.5	14	m $\Omega$
		$V_{GS} = -4.5V, I_D = -5A$	-	13	19	
<b>Dynamic characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -15V, V_{GS} = 0V, f = 1MHz$	-	2800	-	pF
Output Capacitance	$C_{oss}$		-	346	-	
Reverse Transfer Capacitance	$C_{rss}$		-	319	-	
<b>Switching characteristics</b>						
Turn-on delay time	$t_{d(on)}$	$V_{DD} = -15V, I_D = -12A$ $V_{GS} = -10V, R_G = 2.5\Omega$	-	14	-	ns
Turn-on rise time	$t_r$		-	20	-	
Turn-off delay time	$t_{d(off)}$		-	95	-	
Turn-off fall time	$t_f$		-	65	-	
Total Gate Charge	$Q_g$	$V_{DS} = -15V, I_D = -6A,$ $V_{GS} = -10V$	-	30	-	nC
Gate-Source Charge	$Q_{gs}$		-	5.3	-	
Gate-Drain Charge	$Q_{gd}$		-	7.6	-	
<b>Source-Drain Diode characteristics</b>						
Diode Forward voltage <sup>(2)</sup>	$V_{DS}$	$V_{GS} = 0V, I_S = -10A$	-	-	-1.2	V
Diode Forward current <sup>(3)</sup>	$I_S$		-	-	-12	A

**Notes:**

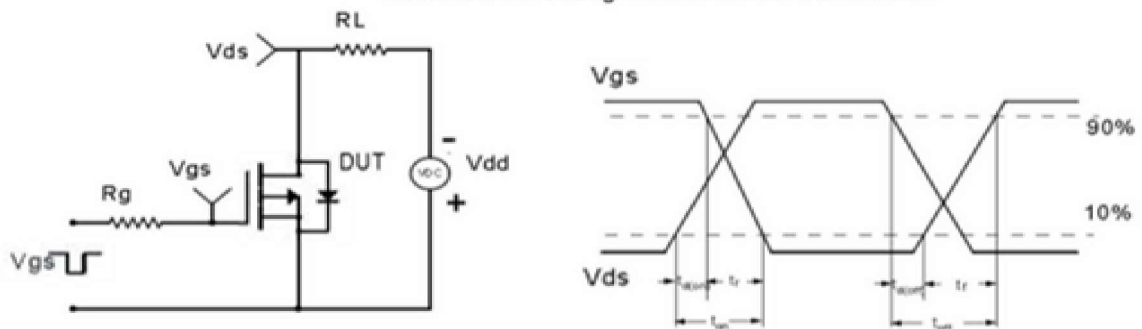
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. Pulse Test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. Surface Mounted on FR4 Board,  $t \leq 10$  sec
4.  $L = 0.5mH, V_{DD} = -15V, R_G = 25\Omega, T_J = 25^\circ\text{C}$

**Test Circuit & Waveform**

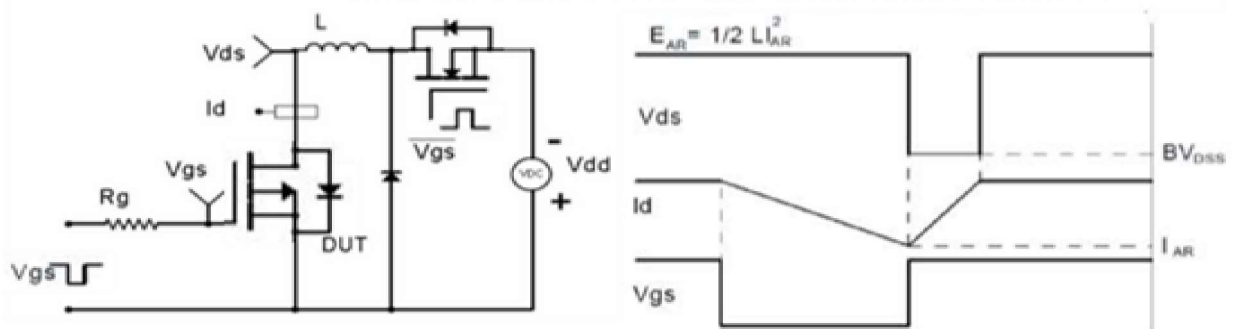
Gate Charge Test Circuit & Waveform



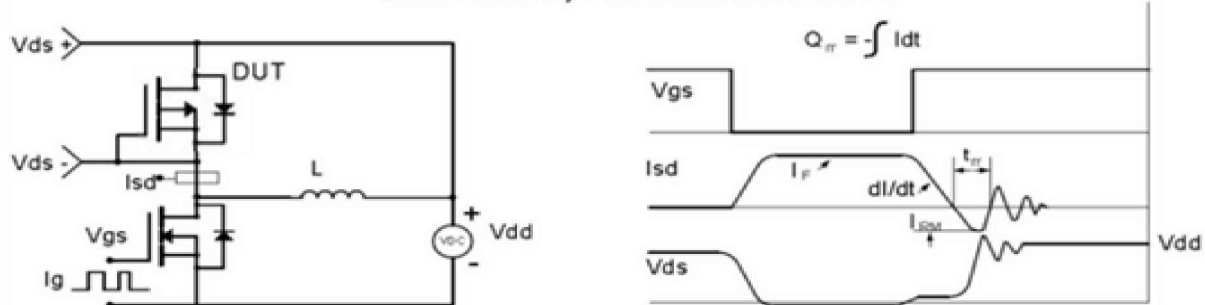
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

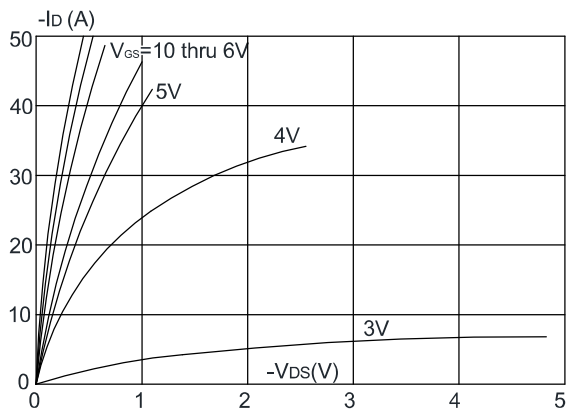


Diode Recovery Test Circuit & Waveforms

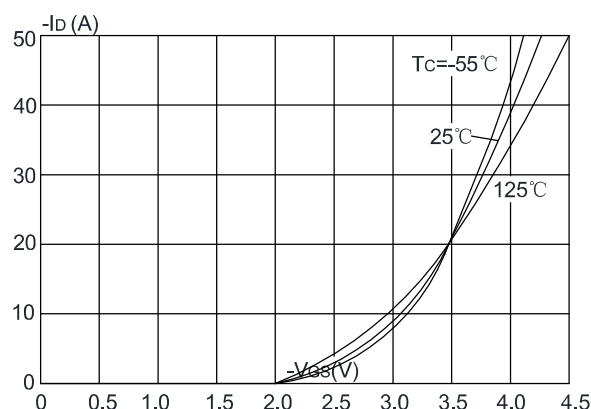


**Typical Performance Characteristics**

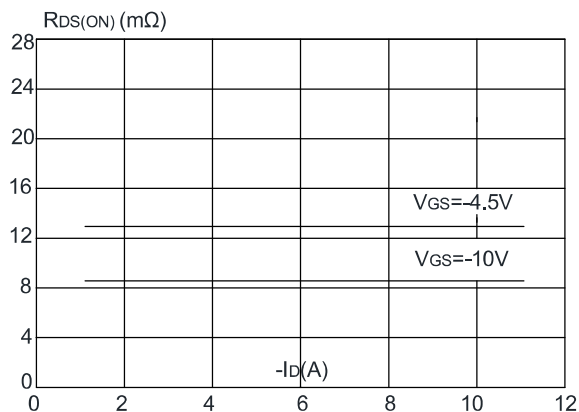
**Figure 1: Output Characteristics**



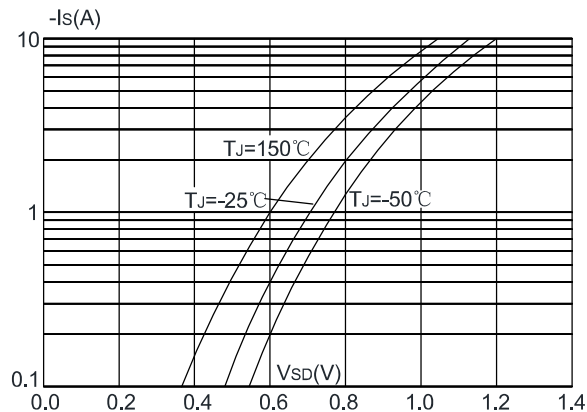
**Figure 2: Typical Transfer Characteristics**



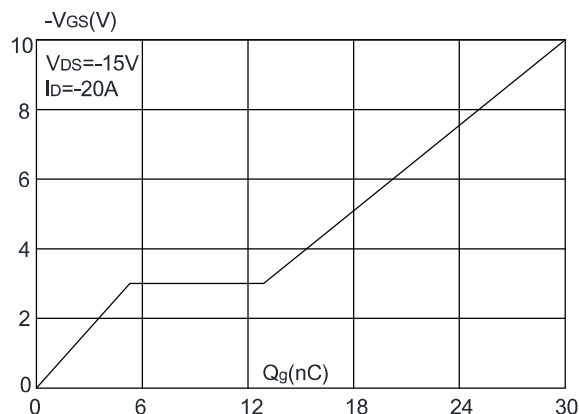
**Figure 3: On-resistance vs. Drain Current**



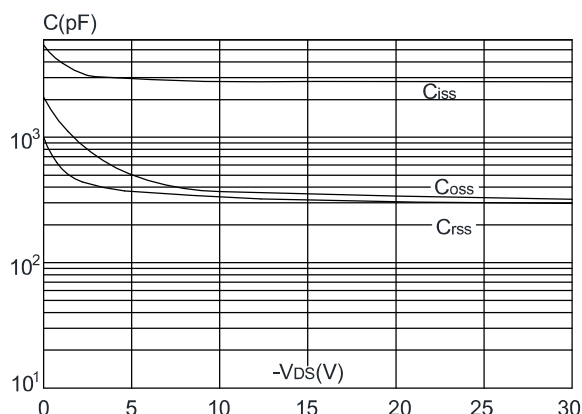
**Figure 4: Body Diode Characteristics**



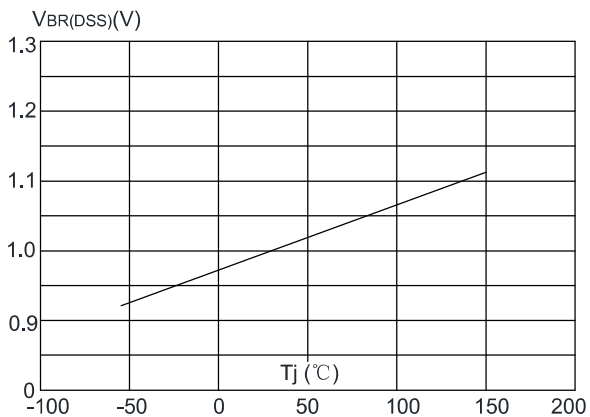
**Figure 5: Gate Charge Characteristics**



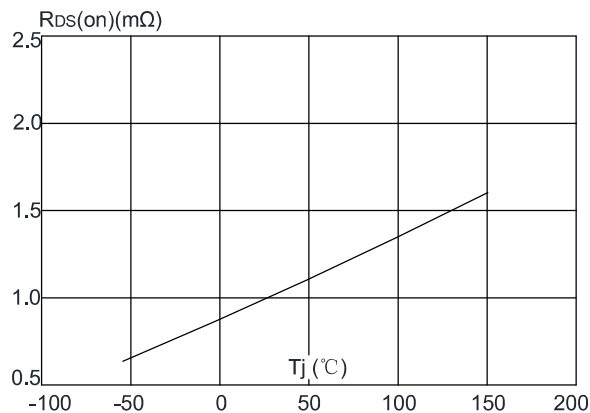
**Figure 6: Capacitance Characteristics**



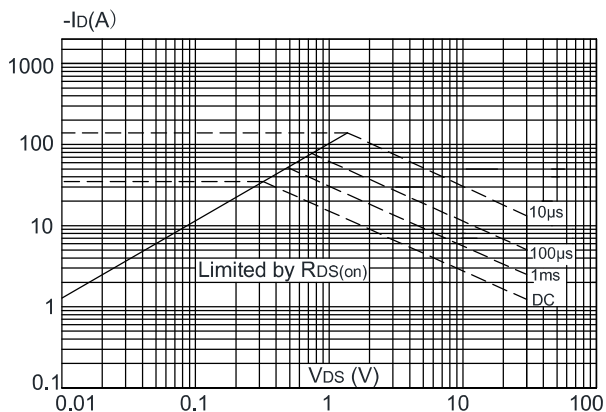
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



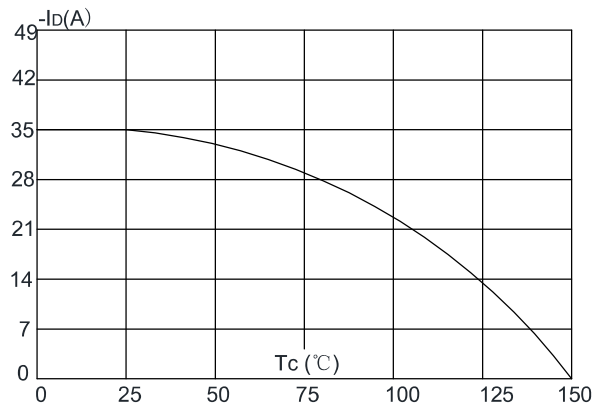
**Figure 8:** Normalized on Resistance vs. Junction Temperature



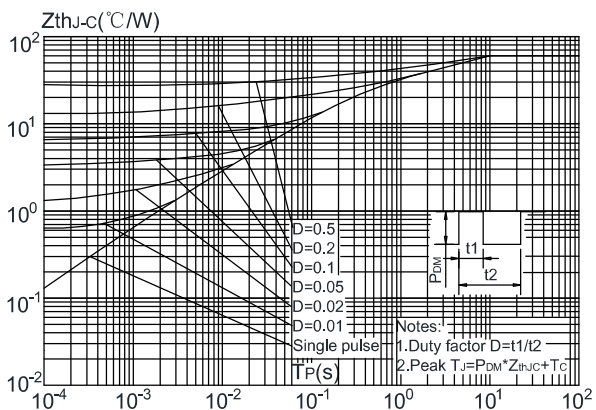
**Figure 9:** Maximum Safe Operating Area



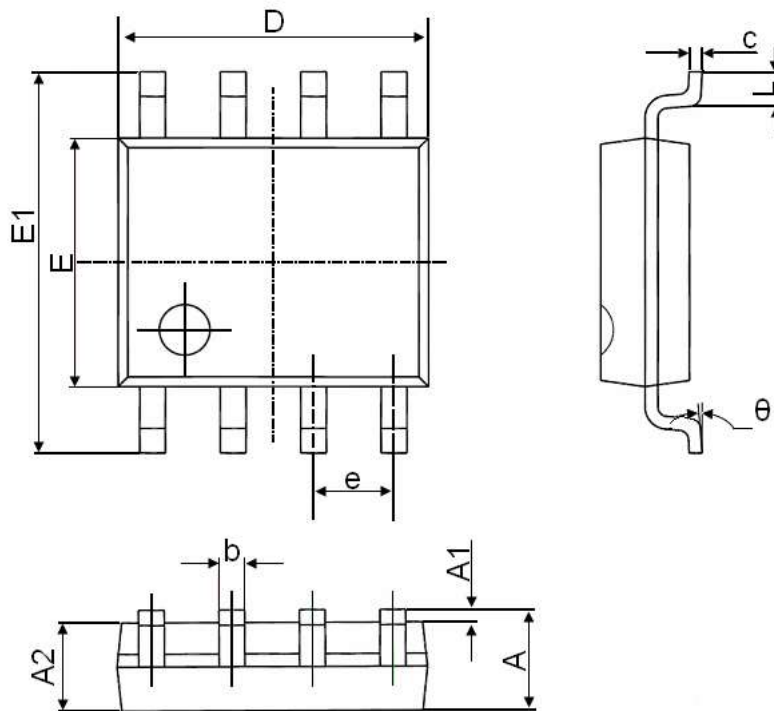
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



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



**SOP-8 Package Information**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°