# Power MOSFET 60V, $80m\Omega$ , 3A, -60V, $137m\Omega$ , -2.5A, Complementary

This Power MOSFET is produced using ON Semiconductor's trench technology, which is specifically designed to minimize gate charge and low on resistance. This device is suitable for applications with low gate charge driving or low on resistance requirements.

#### **Features**

- Low On-Resistance
- 4V drive
- Low-Profile Package
- Complementary N-Channel and P-Channel MOSFET
- ESD Diode-Protected Gate
- Pb-Free, Halogen Free and RoHS compliance

## **Typical Applications**

• Motor Driver

#### **SPECIFICATIONS**

### ABSOLUTE MAXIMUM RATING at Ta = 25°C (Note 1)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain to Source Voltage	VDSS	60	-60	٧
Gate to Source Voltage	VGSS	±20	±20	٧
Drain Current (DC)	ID	3	-2.5	Α
Drain Current (Pulse) PW ≤ 10μs, duty cycle ≤ 1%	IDP	12	-10	Α
Power Dissipation When mounted on ceramic substrate (900mm²×0.8mm) 1unit	PD	0.9		W
Total Dissipation When mounted on ceramic substrate (900mm²×0.8mm)	PT	1.0		V
Junction Temperature	Tj	150		°C
Storage Temperature	Tstg	–55 to	°C	

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

#### THERMAL RESISTANCE RATINGS

THERMAL REGISTANCE RATINGS						
Parameter	Symbol	Value	Unit			
Junction to Ambient						
When mounted on ceramic substrate	$R_{\theta JA}$	138.8	°C/W			
(900mm <sup>2</sup> × 0.8mm) 1unit						

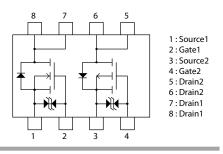


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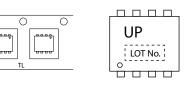
www.onsemi.com

VDSS	R <sub>DS</sub> (on) Max	ID Max	
N-Ch	80mΩ@ 10V		
60V	106mΩ@ 4.5V 3A		
	116mΩ@ 4V		
P-Ch	137mΩ@ –10V		
-60V	180mΩ@ –4.5V	-2.5A	
	194mΩ@ –4V		

# **ELECTRICAL CONNECTION N-Channel and P-Channel**



#### PACKING TYPE : TL



**MARKING** 

#### ORDERING INFORMATION

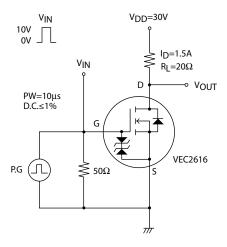
See detailed ordering and shipping information on page 7 of this data sheet.

**ELECTRICAL CHARACTERISTICS** at Ta = 25°C (Note 2)

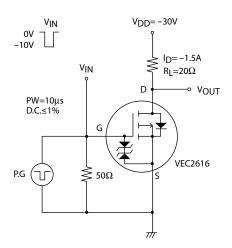
Parameter	Symbol	Conditions	Value			Unit
,			min	typ	max	
[N-Channel]	1		1 1			
Drain to Source Breakdown Voltage	V(BR)DSS	ID=1mA, VGS=0V	60			V
Zero-Gate Voltage Drain Current	IDSS	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V			1	μΑ
Gate to Source Leakage Current	IGSS	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±10	μΑ
Gate Threshold Voltage	VGS(th)	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA	1.2		2.6	V
Forward Transconductance	gFS	V <sub>DS</sub> =10V, I <sub>D</sub> =1.5A		2.6		S
Static Drain to Source On-State Resistance	R <sub>DS</sub> (on)1	I <sub>D</sub> =1.5A, V <sub>GS</sub> =10V		62	80	mΩ
	R <sub>DS</sub> (on)2	I <sub>D</sub> =0.75A, V <sub>GS</sub> =4.5V		76	106	mΩ
redictario	R <sub>DS</sub> (on)3	I <sub>D</sub> =0.75A, V <sub>GS</sub> =4V		83	116	mΩ
Input Capacitance	Ciss			505		pF
Output Capacitance	Coss	V <sub>DS</sub> =20V, f=1MHz		57		pF
Reverse Transfer Capacitance	Crss			37		pF
Turn-ON Delay Time	t <sub>d</sub> (on)			7.3		ns
Rise Time	t <sub>r</sub>			7.5		ns
Turn-OFF Delay Time	t <sub>d</sub> (off)	See specified Test Circuit		41		ns
Fall Time	tf			22		ns
Total Gate Charge	Qg			10		nC
Gate to Source Charge	Qgs	V <sub>DS</sub> =30V, V <sub>GS</sub> =10V, I <sub>D</sub> =3A		1.6		nC
Gate to Drain "Miller" Charge	Qgd			2.1		nC
Forward Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> =3A, V <sub>GS</sub> =0V		0.81	1.2	V
[P-Channel]	•		•			
Drain to Source Breakdown Voltage	V(BR)DSS	ID=-1mA, VGS=0V	-60			V
Zero-Gate Voltage Drain Current	IDSS	V <sub>DS</sub> =-60V, V <sub>GS</sub> =0V			-1	μΑ
Gate to Source Leakage Current	IGSS	V <sub>GS</sub> =±16V, V <sub>DS</sub> =0V			±10	μΑ
Gate Threshold Voltage	V <sub>GS</sub> (th)	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1mA	-1.2		-2.6	V
Forward Transconductance	gFS .	V <sub>DS</sub> =-10V, I <sub>D</sub> =-1.5A		3.9		S
Static Drain to Source On-State	RDS(on)1	I <sub>D</sub> =-1.5A, V <sub>G</sub> S=-10V		105	137	mΩ
	R <sub>DS</sub> (on)2	ID=-0.75A, VGS=-4.5V		128	180	mΩ
Resistance	R <sub>DS</sub> (on)3	ID=-0.75A, VGS=-4V		138	194	mΩ
Input Capacitance	Ciss			420		pF
Output Capacitance	Coss	V <sub>DS</sub> =–20V, f=1MHz		54		pF
Reverse Transfer Capacitance	Crss			44		pF
Turn-ON Delay Time	t <sub>d</sub> (on)			6.4		ns
Rise Time	tr			9.8		ns
Turn-OFF Delay Time	t <sub>d</sub> (off)	See specified Test Circuit		65		ns
Fall Time	tf			36		ns
Total Gate Charge	Qg			11		nC
Gate to Source Charge	Qgs	V <sub>DS</sub> =-30V, V <sub>GS</sub> =-10V, I <sub>D</sub> =-2.5A		1.4		nC
Gate to Drain "Miller" Charge	Qgd	30 11 / 30 11 1, 10 1111		2		nC
Forward Diode Voltage	VSD	I <sub>S</sub> =-2.5A, V <sub>G</sub> S=0V	+	-0.83	-1.2	V

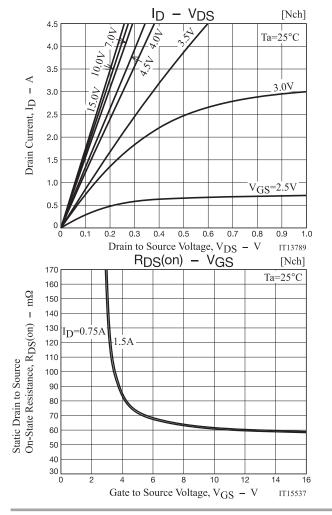
Note 2 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

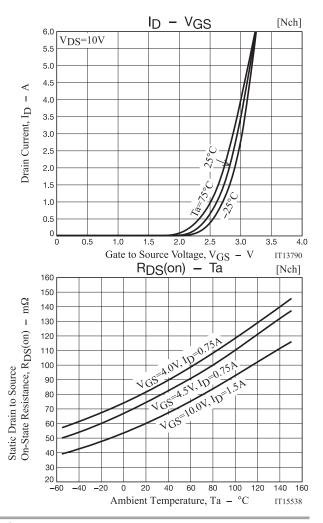
# Switching Time Test Circuit [N-Channel]

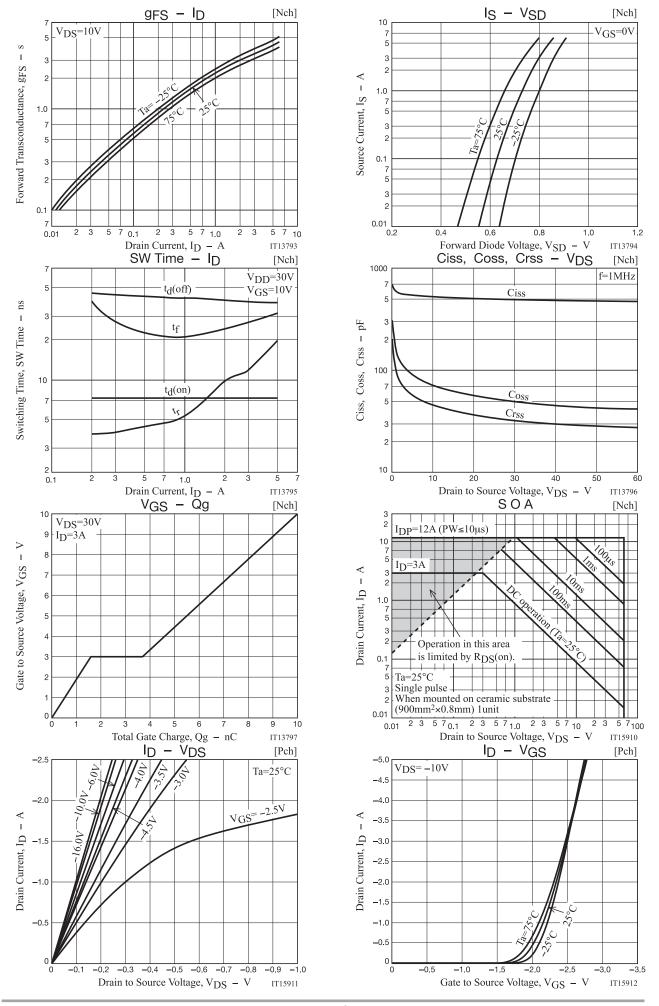


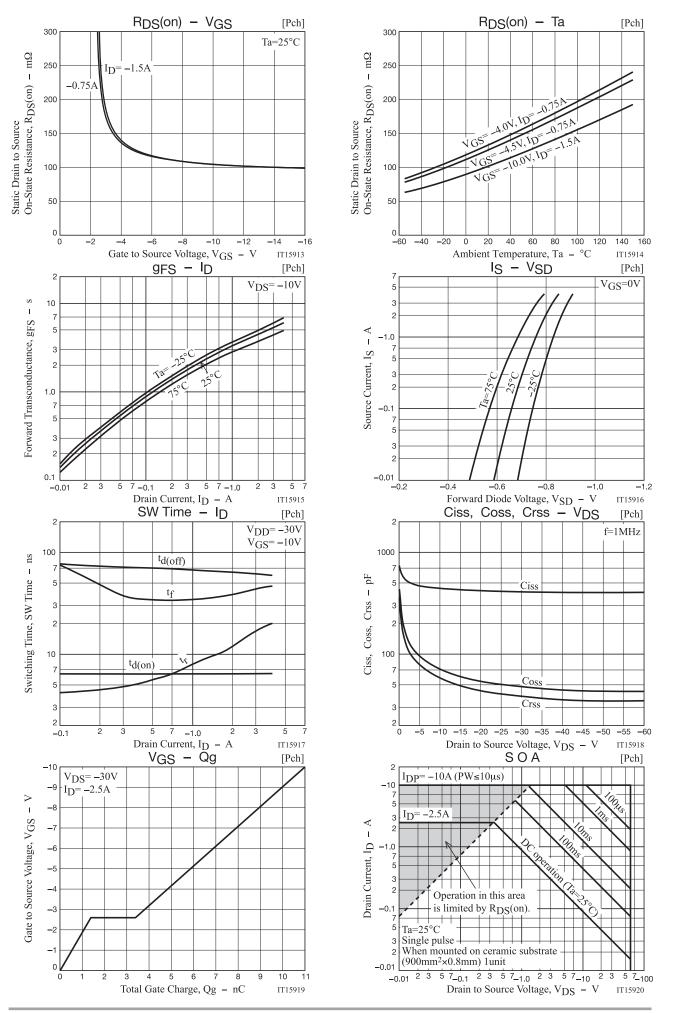
### [P-Channel]

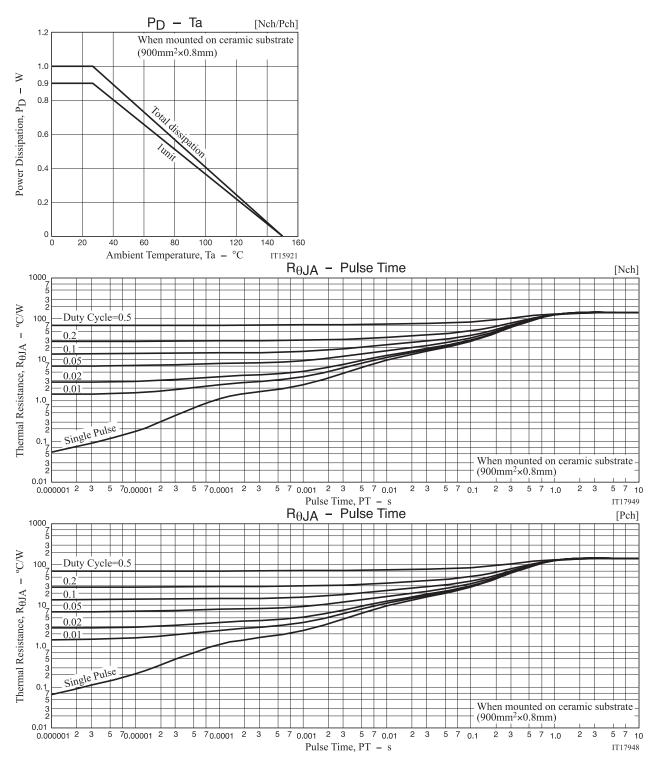






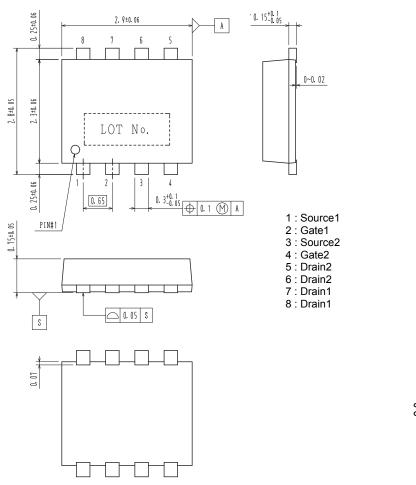




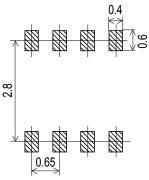


#### PACKAGE DIMENSIONS

unit: mm SOT-28FL/VEC8 CASE 318AH ISSUE O



# Recommended Soldering Footprint



#### ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)	
VEC2616-TL-H	LID	SOT-28FL / VEC8	3,000 / Tape & Reel	
VEC2616-TL-W	UP	(Pb-Free / Halogen Free)		

<sup>†</sup> For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D. http://www.onsemi.com/pub\_link/Collateral/BRD8011-D.PDF

Note on usage: Since the VEC2616 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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