

## P-Channel Power MOSFET

-20V, -6.5A, 26mΩ

### FEATURES

- Fast switching
- Suitable for -1.8V Gate Drive Applications
- Pb-free plating
- RoHS compliant
- Halogen-free mold compound

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{DS}$	-20	V
$I_D$	-6.5	A
$R_{DS(on)}$ (max)	$V_{GS} = -4.5V$	26
	$V_{GS} = -2.5V$	32
	$V_{GS} = -1.8V$	40
$Q_g$	19.5	nC

### APPLICATION

- Battery Pack
- Portable Devices



#### Note:

1. MSL 1 (Moisture Sensitivity Level) for SOT-26 per J-STD-020
2. MSL 3 (Moisture Sensitivity Level) for SOT-23 per J-STD-020

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

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 10$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ\text{C}$	-6.5
		$T_C = 100^\circ\text{C}$	-4.1
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	-26	A
Total Power Dissipation	$P_{DTOT}$	1.56	W
Operating Junction Temperature	$T_J$	150	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	$^\circ\text{C}$

### THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	80	$^\circ\text{C/W}$

**Notes:**  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  is shown for single device operation on FR-4 PCB in still air.

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
<b>Static</b> (Note 2)						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	$BV_{DSS}$	-20	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	$V_{GS(TH)}$	-0.3	-0.6	-1.0	V
Gate Body Leakage	$V_{GS} = \pm 10\text{V}, V_{DS} = 0\text{V}$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}$	$I_{DSS}$	--	--	-1	$\mu\text{A}$
	$V_{DS} = -16\text{V}, T_J = 125^\circ\text{C}$		--	--	-10	
Drain-Source On-State Resistance	$V_{GS} = -4.5\text{V}, I_D = -5\text{A}$	$R_{DS(on)}$	--	21	26	m $\Omega$
	$V_{GS} = -2.5\text{V}, I_D = -4\text{A}$		--	26	32	
	$V_{GS} = -1.8\text{V}, I_D = -3\text{A}$		--	32	40	
Forward Transconductance	$V_{DS} = -10\text{V}, I_S = -5\text{A}$	$g_{fs}$	--	15	--	S
<b>Dynamic</b> (Note 3)						
Total Gate Charge	$V_{DS} = -10\text{V}, I_D = -5\text{A},$ $V_{GS} = -4.5\text{V}$	$Q_g$	--	19.5	--	nC
Gate-Source Charge		$Q_{gs}$	--	2	--	
Gate-Drain Charge		$Q_{gd}$	--	3.6	--	
Input Capacitance	$V_{DS} = -15\text{V}, V_{GS} = 0\text{V},$ $F = 1.0\text{MHz}$	$C_{iss}$	--	1670	--	pF
Output Capacitance		$C_{oss}$	--	220	--	
Reverse Transfer Capacitance		$C_{rss}$	--	120	--	
<b>Switching</b>						
Turn-On Delay Time	$V_{DD} = -10\text{V}, I_D = -1\text{A},$ $V_{GS} = -4.5\text{V},$ $R_{GEN} = 25\Omega$	$t_{d(on)}$	--	10.4	--	ns
Turn-On Rise Time		$t_r$	--	37.5	--	
Turn-Off Delay Time		$t_{d(off)}$	--	89.1	--	
Turn-Off Fall Time		$t_f$	--	24.6	--	
<b>Source-Drain Diode</b>						
Forward Voltage	$V_{GS} = 0\text{V}, I_S = -1\text{A}$	$V_{SD}$	--	--	-1	V
Continuous Forward Current	Integral reverse diode in the MOSFET	$I_S$	--	--	-6.5	A
Pulse Forward Current		$I_{SM}$	--	--	-26	A

**Notes:**

1. Pulse width limited by safe operating area
2. Pulse test:  $PW \leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
3. Switching time is essentially independent of operating temperature.

**ORDERING INFORMATION**

<b>ORDERING CODE</b>	<b>PACKAGE</b>	<b>PACKING</b>
TSM260P02CX RFG	SOT-23	3,000pcs / 7" Reel
TSM260P02CX6 RFG	SOT-26	3,000pcs / 7" Reel

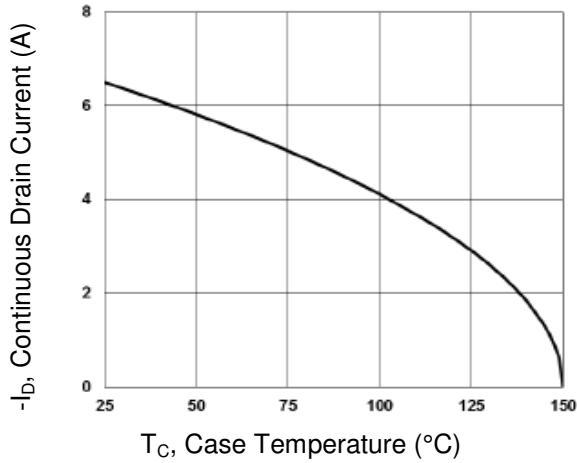
**Note:**

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

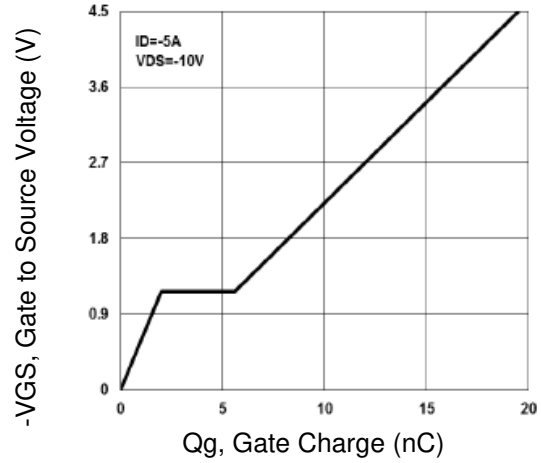
**CHARACTERISTICS CURVES**

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

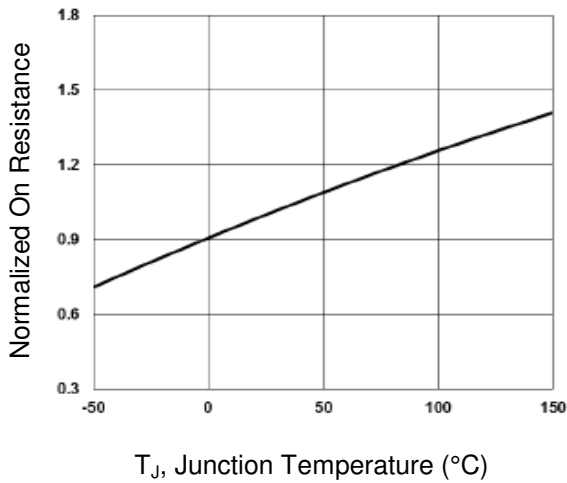
**Continuous Drain Current vs.  $T_C$**



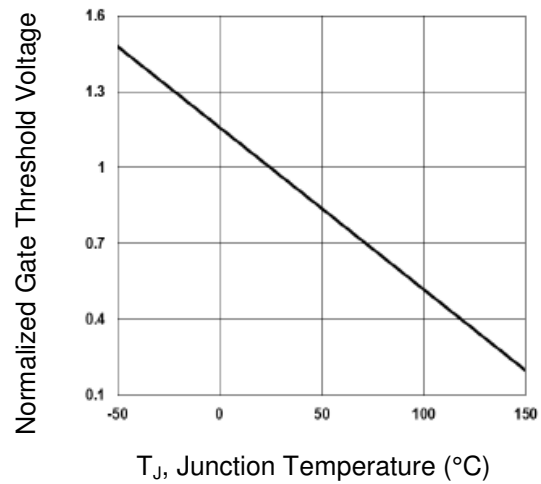
**Gate Charge**



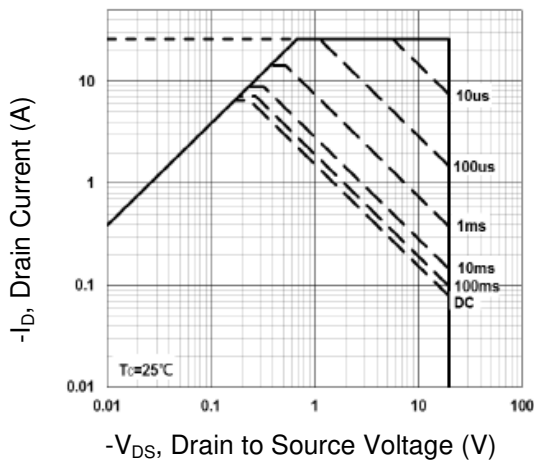
**On-Resistance vs. Junction Temperature**



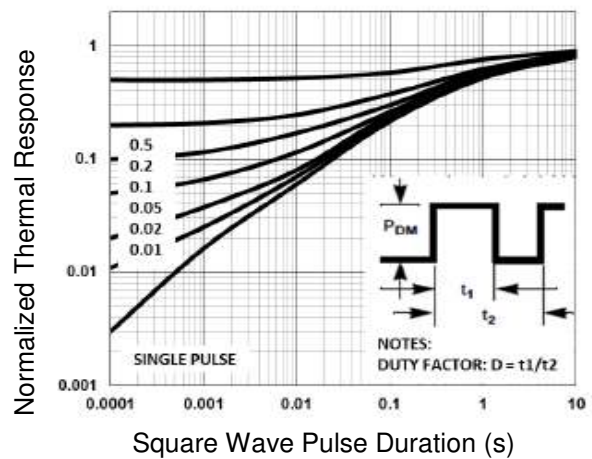
**Threshold Voltage vs. Junction Temperature**



**Maximum Safe Operating Area**

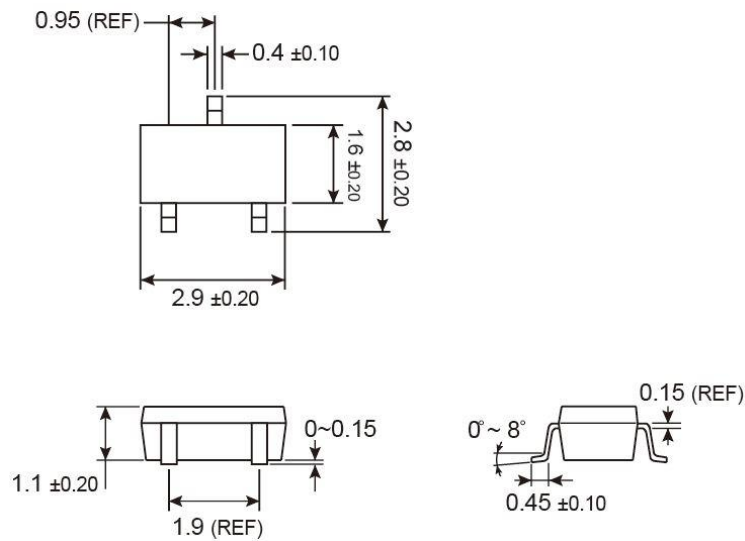


**Normalized Thermal Transient Impedance Curve**

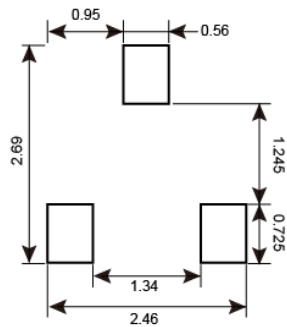


**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

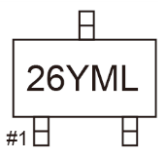
**SOT-23**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



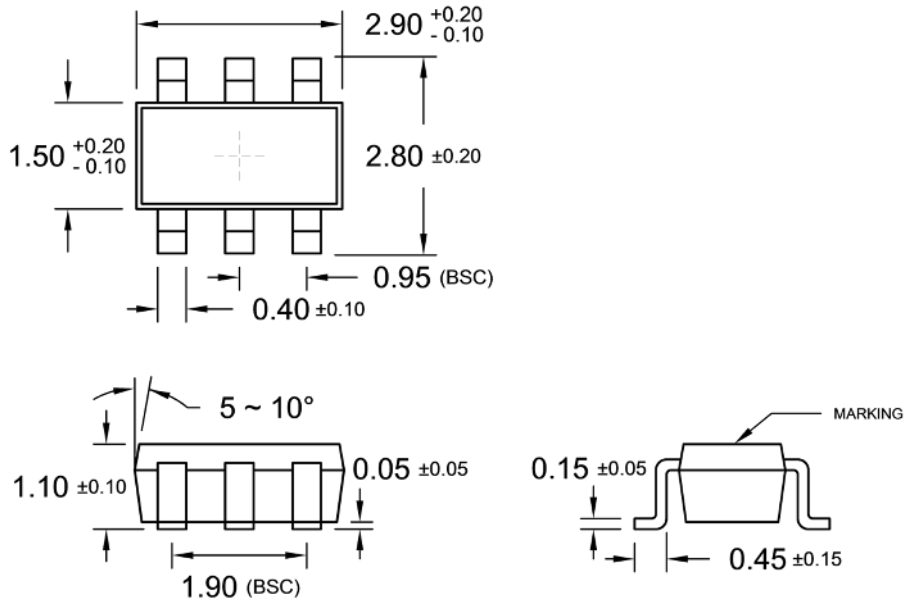
**MARKING DIAGRAM**



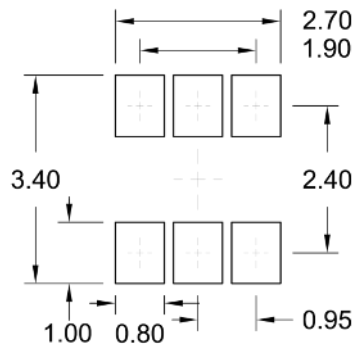
- 26** = Device Code
- Y** = Year Code
- M** = Month Code for Halogen Free Product
  - O** =Jan    **P** =Feb    **Q** =Mar    **R** =Apr
  - S** =May    **T** =Jun    **U** =Jul    **V** =Aug
  - W** =Sep    **X** =Oct    **Y** =Nov    **Z** =Dec
- L** = Lot Code

**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

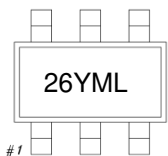
**SOT-26**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



**MARKING DIAGRAM**



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- Y** = Year Code
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